

CA20N
EAB
-0 53

EA-90-01

ENVIRONMENTAL ASSESSMENT BOARD



ONTARIO HYDRO DEMAND/SUPPLY PLAN HEARINGS

VOLUME: 111

DATE: Thursday, February 20, 1992

BEFORE:

| | |
|------------------------------|----------|
| HON. MR. JUSTICE E. SAUNDERS | Chairman |
| DR. G. CONNELL | Member |
| MS. G. PATTERSON | Member |

FARR
ASSOCIATES &
REPORTING INC.

(416) 482-3277

2300 Yonge St. Suite 709 Toronto, Canada M4P 1E4

ENVIRONMENTAL ASSESSMENT BOARD
ONTARIO HYDRO DEMAND/SUPPLY PLAN HEARING

IN THE MATTER OF the Environmental Assessment Act,
R.S.O. 1980, c. 140, as amended, and Regulations
thereunder;

AND IN THE MATTER OF an undertaking by Ontario Hydro
consisting of a program in respect of activities
associated with meeting future electricity
requirements in Ontario.

Held on the 5th Floor, 2200
Yonge Street, Toronto, Ontario,
on Thursday, the 20 day of February,
1992, commencing at 10:00 a.m.

VOLUME 111

B E F O R E :

| | |
|----------------------------------|----------|
| THE HON. MR. JUSTICE E. SAUNDERS | Chairman |
| DR. G. CONNELL | Member |
| MS. G. PATTERSON | Member |

S T A F F :

| | |
|-----------------|---|
| MR. M. HARPUR | Board Counsel |
| MR. R. NUNN | Counsel/Manager, Information Systems |
| MS. C. MARTIN | Administrative Coordinator |
| MS. G. MORRISON | Executive Coordinator |

A P P E A R A N C E S

| | | |
|-------------------|---|-----------------------------|
| B. CAMPBELL |) | ONTARIO HYDRO |
| L. FORMUSA |) | |
| B. HARVIE |) | |
| J.F. HOWARD, Q.C. |) | |
| J. LANE |) | |
| G. A. KARISH |) | |
| | | |
| J.C. SHEPHERD |) | IPPSO |
| I. MONDROW |) | |
| J. PASSMORE |) | |
| | | |
| R. WATSON |) | MUNICIPAL ELECTRIC |
| A. MARK |) | ASSOCIATION |
| | | |
| S. COUBAN |) | PROVINCIAL GOVERNMENT |
| P. MORAN |) | AGENCIES |
| J. MacDONALD |) | |
| | | |
| C. MARLATT |) | NORTH SHORE TRIBAL COUNCIL, |
| D. ESTRIN |) | UNITED CHIEFS AND COUNCILS |
| | | OF MANITOULIN, UNION OF |
| | | ONTARIO INDIANS |
| | | |
| D. POCH |) | COALITION OF ENVIRONMENTAL |
| D. STARKMAN |) | GROUPS |
| D. ARGUE |) | |
| | | |
| T. ROCKINGHAM | | MINISTRY OF ENERGY |
| | | |
| B. KELSEY |) | NORTHWATCH |
| L. GREENSPOON |) | |
| P. McKAY |) | |
| | | |
| J.M. RODGER | | AMPCO |
| | | |
| M. MATTSON |) | ENERGY PROBE |
| D. CHAPMAN |) | |
| | | |
| A. WAFFLE | | ENVIRONMENT CANADA |
| | | |
| M. CAMPBELL |) | ONTARIO PUBLIC HEALTH |
| M. IZZARD |) | ASSOCIATION, INTERNATIONAL |
| | | INSTITUTE OF CONCERN FOR |
| | | PUBLIC HEALTH |
| | | |
| G. GRENVILLE-WOOD | | SESCI |

Digitized by the Internet Archive
in 2022 with funding from
University of Toronto

<https://archive.org/details/31761114684830>

A P P E A R A N C E S

(Cont'd)

| | | |
|-----------------|---|--|
| D. ROGERS | | ONGA |
| H. POCH |) | CITY OF TORONTO |
| J. PARKINSON |) | |
| R. POWER | | CITY OF TORONTO, SOUTH BRUCE ECONOMIC CORP. |
| S. THOMPSON | | ONTARIO FEDERATION OF AGRICULTURE |
| B. BODNER | | CONSUMERS GAS |
| J. MONGER |) | CAC (ONTARIO) |
| K. ROSENBERG |) | |
| C. GATES |) | |
| W. TRIVETT | | RON HUNTER |
| M. KLIPPENSTEIN | | POLLUTION PROBE |
| N. KLEER |) | NAN/TREATY #3/TEME-AUGAMA |
| J. OLTHUIS |) | ANISHNABAI AND MOOSE RIVER/ |
| J. CASTRILLI |) | JAMES BAY COALITION |
| T. HILL | | TOWN OF NEWCASTLE |
| M. OMATSU |) | OMAA |
| B. ALLISON |) | |
| C. REID |) | |
| E. LOCKERBY | | AECL |
| C. SPOEL |) | CANADIAN VOICE OF WOMEN |
| U. FRANKLIN |) | FOR PEACE |
| B. CARR |) | |
| F. MACKESY | | ON HER OWN BEHALF |
| D. HUNTER |) | DOFASCO |
| M. BADER |) | |
| B. TAYLOR |) | MOOSONEE DEVELOPMENT AREA |
| D. HORNER |) | BOARD AND CHAMBER OF |
| H. WATSON |) | COMMERCE |

A P P E A R A N C E S
(Cont'd)

| | | |
|--------------|---|---|
| T. HEINTZMAN |) | ATOMIC ENERGY OF CANADA |
| D. HAMER |) | |
| C. FINDLAY |) | |
| P.A. NYKANEN |) | CANADIAN MANUFACTURERS ASSOCIATION - ONTARIO |
| G. MITCHELL | | SOCIETY OF AECL PROFESSIONAL EMPLOYEES |
| S. GOUDGE | | CUPE |
| D. COLBORNE | | NIPIGON ABORIGINAL PEOPLES' ALLIANCE |
| R. CUYLER | | ON HIS OWN BEHALF |

I N D E X o f P R O C E E D I N G S

| | <u>Page No.</u> |
|---|-----------------|
| <u>ARTHUR RAYMOND EFFER,</u> <u>CHARLES WILLIAM DAWSON,</u> <u>JAMES RICHARD BURPEE,</u> <u>GARY NEIL MEEHAN,</u> <u>JOHN DOUGLAS SMITH,</u> <u>AMIR SHALABY; Resumed.</u> | 19311 |
| Cross-Examination by Mr. Watson (Cont'd) | 19311 |
| Cross-Examination by Mr. Rodger | 19391 |
| Cross-Examination by Mr. Cuyler | 19428 |
| Cross-Examination by Mr. Rogers | 19460 |

L I S T o f E X H I B I T S

| <u>No.</u> | <u>Description</u> | <u>Page No.</u> |
|------------|--|-----------------|
| 475.9 | Interrogatory No. 9.9.21. | 19334 |
| 475.10 | Interrogatory No. 2.9.12. | 19342 |
| 475.11 | Interrogatory No. 2.7.45. | 19344 |
| 475.12 | Interrogatory No. 8.9.61. | 19344 |
| 475.13 | Interrogatory No. 2.14.89. | 19349 |
| 475.14 | Interrogatory No. 2.6.16. | 19354 |
| 480 | Materials referred to by AMPCO in cross-examination of Panel 8. | 19391 |
| 475.15 | Interrogatory No. 8.24.2. | 19404 |

L I S T o f U N D E R T A K I N G S

| <u>No.</u> | <u>Description</u> | <u>Page No.</u> |
|------------|---|-----------------|
| 478.8 | Ontario Hydro undertakes to provide OM&A costs for 1990 and 1991. | 19352 |
| 478.9 | Ontario Hydro undertakes to provide a list of the utilities contacted in the review mentioned by Mr. Burpee, the rationale for doing life extension, and background for the statement in Panel 2, the results of that investigation mentioned on line 7 of page 2865 of transcript. | 19361 |
| 478.10 | Dr. Effer to find out whether Hydro is engaged in studies to determine the contribution of NUGs to CO(2) emissions; and if studies are being undertaken by Hydro, for Hydro to let MEA know and to produce the studies when they are ready. | 19371 |
| 478.11 | Ontario Hydro undertakes to provide consultant studies re the potential conversion of a number of stations such as Keith and Lakeview. | 19400 |

TIME NOTATIONSPage No.

| | | | |
|-----------------|------------|-------|-------|
| | 10:00 a.m. | ----- | 19311 |
| | 10:10 a.m. | ----- | 19318 |
| | 10:20 a.m. | ----- | 19326 |
| | 10:37 a.m. | ----- | 19337 |
| | 10:50 a.m. | ----- | 19348 |
| | 11:12 a.m. | ----- | 19362 |
| Recess | 11:30 a.m. | ----- | 19375 |
| Resume | 11:45 a.m. | ----- | 19375 |
| | 12:12 p.m. | ----- | 19387 |
| | 12:30 p.m. | ----- | 19397 |
| | 12:50 p.m. | ----- | 19410 |
| Luncheon recess | 12:55 p.m. | ----- | 19412 |
| Resume | 2:34 p.m. | ----- | 19412 |
| | 2:50 p.m. | ----- | 19421 |
| | 3:09 p.m. | ----- | 19436 |
| | 3:30 p.m. | ----- | 19451 |
| Recess | 3:45 p.m. | ----- | 19460 |
| Resume | 4:00 p.m. | ----- | 19460 |
| | 4:11 p.m. | ----- | 19467 |
| Adjourned | 4:30 p.m. | ----- | 19482 |

1 ---Upon commencing at 10:00 a.m.

2 THE REGISTRAR: Please come to order.

3 This hearing is now in session. Be seated, please.

4 THE CHAIRMAN: Mr. Watson?

5 MR. WATSON: Thank you, Mr. Chairman.

6 ARTHUR RAYMOND EFFER,
7 CHARLES WILLIAM DAWSON,
8 JAMES RICHARD BURPEE,
9 GARY NEIL MEEHAN,
JOHN DOUGLAS SMITH,
AMIR SHALABY; Resumed

10 CROSS-EXAMINATION BY MR. WATSON (Cont'd):

11 Q. You recall yesterday we were going
12 through the Depreciation Review Committee reports
13 looking at the decisions with respect to life
14 extension. We are now up to the 1988 report, which is
15 for the year -- sorry, the 1989 report for the year
16 1990, and you will find that on page 3 of Exhibit 479.
17 Again, today I anticipate that most of my questions
18 will be for Mr. Burpee and Mr. Meehan on this topic.

19 Now, in 1989 the Committee again
20 recommended the service life be 40 years, and as I
21 understand it, at that time the Committee and Hydro had
22 both the Lakeview and Lambton inspections completed; is
23 that correct?

24 MR. MEEHAN: A. Yes, that's correct.

25 Q. Now, I understand from your evidence

1 in direct that baseline assessments are key to the life
2 extension decision is that fair?

3 MR. BURPEE: A. Yes, it is.

4 Q. And I further understand from your
5 direct that currently Nanticoke is under going a
6 baseline assessment.

7 A. That's also correct.

8 Q. I guess my simple question is: If
9 baseline assessments are key and Nanticoke hasn't
10 completed, or you haven't completed the Nanticoke
11 assessment yet, how can you make a life extension
12 decision about Nanticoke?

13 A. I think Nanticoke, the idea of a life
14 assessment or the baseline assessment is to start
15 developing specific detailed reinvestment profiles.

16 The decision with regards to life
17 extension and the idea of costs can be done without
18 having that work done in terms of -- as a planning
19 exercise, which Mr. Meehan is more qualified to talk
20 to, but in terms of having some idea of the costs we do
21 have the cost of rehabilitating Lakeview, the cost of
22 what the individual jobs are. We have a fair amount, a
23 wealth of experience in terms of repairs required to
24 date to get units up to in the neighbourhood of 145,000
25 operating hours and we have also looked at what other

1 utilities have done in the states.

2 So, we do have some feel for what the
3 costs are going to be.

4 Q. Two things, Mr. Burpee, first of all
5 you agreed with me yesterday that life extension was
6 site-specific, and second of all, Mr. Meehan told us
7 that this is a relatively new area, you just started to
8 thinking about this in the last couple of years. And
9 when you combine this with your evidence that baseline
10 assessments are key in life extension decisions, it
11 seems to me that you are in a difficult position.

12 A. I'm not sure why.

13 Q. Let me put it another way.

14 THE CHAIRMAN: The question I think is
15 largely argumentative.

16 MR. WATSON: Okay. I will move on, Mr.
17 Chairman. I have illustrated my client's concerns with
18 respect to this area.

19 Q. Another concern with respect to life
20 extension deals with what Panel 2 was referring to at
21 Volume 25, page 4369.

22 MR. BURPEE: A. What was the page
23 number?

24 Q. Volume 25, 4369, and then it will go
25 over to 4370 as well, Mr. Burpee.

1 You will see there that Mr. Starkman was
2 cross-examining Panel 2, and on line 15, page 4369, Mr.
3 Taborek answers, and he is talking about the difference
4 between the U.S. and Ontario Hydro with respect to life
5 extension, Mr. Taborek says:

6 "Are at their mid-life. The plants
7 that the Americans are looking closely at
8 are closer toward the end of their life.
9 We have made the point that it is an
10 academic exercise to attempt to judge
11 future conditions too early in a plant's
12 life.

13 "So that it was perhaps appropriate
14 for the Americans to be looking at life
15 extension; it is certainly not
16 appropriate for us to be considering it."

17 My question, Mr. Burpee, is, this just
18 appears to be a completely different philosophy. We
19 are not talking about some of the things that you have
20 been referring to earlier. We are talking about a
21 philosophy of when you do this, and this evidence just
22 seems diametrically opposed to what you have been
23 giving. Can you help me with that?

24 A. I can only answer some of the
25 technical aspects, not the planning aspects. This is a

1 planning question.

2 MR. MEEHAN: A. I think the amount of
3 information we have on the topic has just changed
4 considerably in the last while. I don't think there is
5 much more to it than that.

6 THE CHAIRMAN: What information are you
7 talking about?

8 MR. MEEHAN: I am sorry?

9 THE CHAIRMAN: What information are you
10 talking about?

11 MR. MEEHAN: Information with respect to
12 the costs of life managing the facilities.

13 We have always, as I have said before,
14 thought it would be technically feasible to do it. We
15 always knew we could keep the old car running. What
16 the cost of doing that would be though was an unknown
17 thing to us. The other thing that was unknown was the
18 amount of environmental control equipment we would have
19 to add to these.

20 We have made some decisions with respect
21 to the environmental stuff that we would add and we
22 have a better estimate on the costs of the life
23 management of these stations because of the information
24 we have gathered over the last little while.

25 Perhaps the information hadn't come

1 together, hadn't built to the point, when Panel 2
2 discussed this issue, that Panel 2 could take a
3 different view than it had.

4 MR. WATSON: Q. Just so that we are not
5 confused about this, Mr. Meehan, the information that
6 you are talking is the information from the Lakeview
7 and the Lambton rehabilitation projects; isn't that
8 fair?

9 MR. BURPEE: A. That's only part of the
10 information.

11 Q. Let's deal with that. That's part of
12 the information and those assessments were done in the
13 mid to late 80s and the projects have been under way
14 for some time.

15 A. I think what is more important is to
16 go back and look at how within the stations it's
17 evolved. We went into a rehab process, the rehab costs
18 started to be more expensive than what we originally
19 viewed they would be. A lot of the American utilities
20 similarly were doing into life management processes and
21 a lot even then were going into, I suppose, into life
22 extension with their older plants. And applying some
23 of the same processes we started thinking instead of
24 rehab we decided to go down life management route, so
25 we started putting our thinking together on that, what

1 it would take, what it would cost, with the view to get
2 into the 40 years which is what was required at the
3 time.

4 The other driver for us was, as I have
5 mentioned in the past, is the component integrity or
6 safety of the plant people and guaranteeing the
7 condition of high pressure, high temperature
8 components, and a lot of work focused on just being
9 able to guarantee to the satisfaction of ourselves, our
10 employees and the Ministry of Consumer and Commercial
11 Relations that indeed the plants were safe.

12 The same methodologies used for that are
13 encompassed in life management, and it was after a
14 period of time that life management, the idea of having
15 good control over the facility over a long period of
16 time lead or evolved into life extension.

17 The other new information is we have gone
18 back and looked at some other utility experience in the
19 U.S. and U.K. and find that a number of them are
20 counting on life extension, and are going through the
21 exact same process in terms of assessments and then
22 doing analysis of the assessments or determining
23 reinvestment rates and are going 45, 50 years or more.
24 And more importantly in my books is the fact that CGEB
25 before its break up may still continue that way.

1 THE CHAIRMAN: I'm sorry, I didn't hear
2 that last part.

3 MR. BURPEE: The CEGB, I quote the CEGB,
4 the Central Electricity Generating Board in United
5 Kingdom doesn't exist anymore, they split up and they
6 were privatized. Before their split-up they looked at
7 moving their units to 300,000 operating hours for their
8 larger units. From what I understand they have
9 continued with that philosophy since -- I believe it's
10 Power Gen and National Power still view their units as
11 going to 300,000 operating hours. Their original view
12 was 100- to 150,000 hours, 30 years, 100- to 150,000
13 hours and now they are going 45 years, 300,000 hours
14 for their base load units.

15 MR. MEEHAN: I think it is fair to say as
16 well that if we were to construct a new fossil fueled
17 generating station we would want to enter a life
18 management program immediately. It's not something
19 that we would want to wait 15 years into the life of a
20 station before we started; we would begin immediately
21 to collect the baseline data.

22 [10:10 a.m.]

23 MR. WATSON: Q. And the idea is
24 continued onto the next page, page 4370. And the panel
25 concludes near the bottom on line 20 that the best

1 information that we can provide you with after a good
2 deal of work and good deal of thought is that that is
3 the appropriate life to use, and that furthermore that
4 is the life that will actually be experienced.

5 Now, if the quote had just stopped before
6 that last line, I would have taken the answer you had
7 given just a few minutes ago and tried to apply it to
8 that and understand it in that context.

9 However, it goes on further and says,
10 makes a reasonably definitive statement that that is
11 the life that will actually be experienced.

12 Can you help me out with that. Is your
13 answer still the same?

14 MR. MEEHAN: A. That was certainly the
15 corporate view at that time. The corporate view at
16 that time was that the life of these stations would in
17 fact be 40 years. That view has changed, and it has
18 changed since Panel 2 has been before this Board.

19 Now, some of the information was
20 building --

21 THE CHAIRMAN: Sorry to interrupt. But I
22 am just not quite sure. Is there now a set number of
23 years or is it an indefinite, I am not quite sure I
24 understand that part.

25 MR. MEEHAN: There is not a set number of

1 years now. There is an indefinite period at the
2 moment. I think in the future we will have to come to
3 grips with that. The only change that has been made so
4 far is with respect to how we do our planning. And we
5 can do our planning by extending the lives through the
6 year 2014, is essentially what has been done.

7 THE CHAIRMAN: But the world doesn't come
8 to an end in 2014. What goes on after that from a
9 planning point of view.

10 MR. MEEHAN: I think it's fair to say
11 that from a planning point of view, we have assumed
12 that there will be a ten-year extension or longer, but
13 it has not been decided yet. The financial end of the
14 organization, I suppose, is wrestling with this point
15 right now as to whether they will continue to
16 depreciate the facility over a 40-year life or whether
17 they will use 50 or 60 or an indefinite life.

18 They could use an indefinite life because
19 the major components within the station have their own
20 asset life; it may be 20 years or 40 years or 50 years.
21 But the lifetime we are talking about is the ceiling
22 lifetime that.... Nothing exceeds the lifetime that we
23 are talking about here for depreciation purposes.

24 THE CHAIRMAN: But you are saying for
25 planning purposes now there is no life for a fossil

1 station, no life period for a fossil station?

2 MR. MEEHAN: For planning purposes we are
3 assuming a 40-year life for all generating stations
4 except Nanticoke and Lambton. We have assumed that the
5 life of those two stations would be extended and --

6 THE CHAIRMAN: Beyond 40 years?

7 MR. MEEHAN: Beyond 40 years and beyond
8 the year 2014.

9 But we have not established whether it
10 would be an indefinite life or something shorter. We
11 could well determine in the next short while that a
12 50-year life is the appropriate life for planning
13 purposes or it could be 60 years.

14 THE CHAIRMAN: But as you see it at the
15 moment, it is more than 40 in any event?

16 MR. MEEHAN: More than 40 is what is
17 being assumed for those two stations, yes.

18 MR. WATSON: Q. Mr. Meehan, following up
19 on that, that was an area I wanted to deal with
20 somewhat later, but isn't this somewhat unusual in
21 Hydro's planning. Last year you had a retirement date
22 for Nanticoke and Lambton and ten years ago you did and
23 20 years ago you did.

24 MR. MEEHAN: A. No, I can't say that it
25 is unusual because, as I have mentioned earlier,

1 between 1984 and 1989, the planning was done on a
2 different basis than the Depreciation Review Committee
3 was recommending for the purposes of rate setting.

4 In that period, we were planning on a
5 40-year life for four or five years for all our fossil
6 stations when the Depreciation Review Committee was
7 taking the position at the Ontario Energy Board that
8 for rate setting purposes the lives would be 30 or 35
9 years. So it is not unusual what it is we are doing.

10 Q. I think you may have missed the point
11 of my question, Mr. Meehan. You have just told us that
12 for planning purposes you were planning on a 40-year
13 life five years ago; isn't that fair? And prior to
14 that, you were planning on a 30-year life. So you had
15 a planning target, you had programs in place to reach
16 that planning target, and now your position is that you
17 do not have a target.

18 A. Yes. If you --

19 Q. Is that correct?

20 A. Yes, we do not have a target life for
21 these two stations and that is the beauty of a life
22 management program is that essentially what you are
23 doing is you are looking far enough into the future to
24 see what kind of repairs you are needing to make in
25 order to get through the life that may be

1 indeterminate. You don't need a definite life if you
2 are into a life management program.

3 Q. And your evidence is this is the
4 preferable way to go with the life management program?

5 A. Yes. I have certainly bought into
6 the idea.

7 Q. So does that mean that this is now
8 Hydro policy and that policy is going to be applied to
9 all of their generating stations?

10 A. I think the answer to that is yes.
11 We are certainly trying to make it that.

12 THE CHAIRMAN: But I take it also for
13 planning purposes that at some point you have to make a
14 decision as to when the life of a facility is coming to
15 an end so that you can plan what you do in that
16 eventuality. There has to be some lead time for that
17 decision; is that right?

18 MR. MEEHAN: Yes. And the lead time for
19 that would be in fact the lead time for replacement
20 facilities.

21 MR. WATSON: Q. Finally Mr. Meehan, you
22 will be glad to hear we are at the last of the DRC
23 recommendations. That's on page 2 of Exhibit 479. And
24 that as we have indicated is 40 years. You will notice
25 the first bullet is a recommendation. The second

1 bullet talks about maintenance strategies and programs
2 that are being adopted at in-service fossil generation
3 stations which support a 40-year station service life.

4 I assume that what we were talking about
5 yesterday, the \$9 million per year with respect to
6 Lambton would be added on to this; is that fair?

7 MR. MEEHAN: A. I'm sorry. Would be
8 added on to what?

9 Q. We are looking at page 2 of Exhibit
10 479, the recommendation effective January 1, 1991. The
11 first bullet is the recommendation. And then you see
12 the second bullet starts with the words "Maintenance
13 strategies..."?

14 A. Yes.

15 Q. And it talks about strategies and
16 programs which support a 40-year station service life.
17 Do you have that?

18 A. Yes.

19 Q. And you recall yesterday, you told us
20 about a \$9 million per year program for Lambton.

21 A. Yes.

22 Q. That is up to the 40th year of its
23 life; correct?

24 A. Yes. I understand your question.

25 Q. And my question is: Is that \$9

1 million a year added to this?

2 A. I believe that would be the case.

3 Following rehabilitation's completion in 1996.

4 Q. Yes.

5 A. There would be an addition of the 9
6 million that we were talking about the other day.

7 Q. Just to complete the thought, that
8 goes up to the 40th year of the station's life. And
9 your evidence yesterday was that after the 40th year,
10 there is \$12 million a year that would be put into
11 Lambton.

12 A. That's correct.

13 MR. BURPEE: A. When this was prepared,
14 keep in mind they still had a full scope rehab at
15 Lambton. This went into effect January 1, 1991. It
16 was prepared in late 1990. So it assumed the full
17 scope. So that's why the \$9 million would not have
18 been included.

19 MR. MEEHAN: A. It would not have been
20 included in last year's submission. It should be
21 included in this year's submission, if that's your
22 question.

23 Q. But that still doesn't get us up to
24 full reliability, though, does it?

25 A. Not to the reliability that we were

1 assuming in the original scope for Lambton.

2 [10:20 a.m.]

3 Q. The third bullet talks about carbon
4 dioxide and carbon dioxide and other environmental
5 issues are an important factor in life extension. You
6 have no difficulty with that, do you?

7 A. No, I have no difficulty.

8 Q. Finally, the fourth bullet talks
9 about the Lakeview and Lambton life extension programs
10 and how they support a 40-year station service life.

11 Just so I have it in context, what we are
12 now talking about is, in effect, life extending the
13 life extended units; is that correct?

14 A. By these words here? These words
15 here --

16 Q. That's the reality of the situation;
17 isn't it?

18 A. No, these words here are extending
19 the lives of Nanticoke -- or Lambton, rather, from 35
20 years to 40 years, is the way I am interpreting that.

21 Q. Yes. And now what we are talking
22 today is life extending those life extended units.

23 A. That's correct.

24 THE CHAIRMAN: I think only one of them,
25 isn't that right, just Lambton, not Lakeview.

1 MR. BURPEE: Yes, Lakeview remains at 40
2 years.

3 MR. WATSON: Yes.

4 Q. And, panel, if I could take you to
5 Volume 19, page 3371.

6 MR. BURPEE: A. 3371?

7 Q. Yes. Down at the bottom of the page,
8 the answer starting at line 20. There is a discussion
9 with respect to capability of units, and the answer is:

10 "Yes, it would.

11 "But, I think I come back to the fact
12 that at 40 years this a long life for
13 fossil units, it's longer than they were
14 designed for, and we believe it to be the
15 most appropriate life to use in
16 planning."

17 My question, Mr. Meehan, is, is it fair
18 to say that the original design life is important in
19 looking at life extension decisions?

20 MR. MEEHAN: A. I think Mr. Dawson
21 testified that --

22 THE CHAIRMAN: No, please answer the
23 question first and then comment on it afterwards.

24 MR. MEEHAN: Would you repeat the
25 question, please?

1 MR. WATSON: Q. Is it fair to say that
2 the original design life is significant with respect to
3 life extension decisions?

4 MR. MEEHAN: A. I'm not just sure how to
5 answer that question actually directly.

6 The original design life is based on a
7 knowledge of the equipment that is available, and I
8 think may or may not be an important determinant in
9 this matter.

10 MR. BURPEE: A. When we did the first
11 life assessments at Lakeview we tried to find out from
12 the manufacturers what the design life was from certain
13 components and we never got after answer back.

14 So it's hard to say, is there a design
15 life for a plant? I am not sure there is.

16 Conceptually there is a life of the
17 plant, but the components within the plant themselves
18 might have finite lives, like within the boiler certain
19 components that are exposed to certain temperatures
20 have a certain creep life, but that's never expressed
21 in years, it is expressed hours, and it might be in the
22 order of 400-, 500,000 operating hours, that
23 temperature.

24 MR. MEEHAN: A. When system planning
25 specifies a new generating station as they did for

1 Nanticoke and Lambton, with the knowledge that is
2 available to the planning engineer in these cases he
3 specified that the station should be suitable or
4 capable of operating at reliable service purpose for a
5 30-year life. That was the specified life. And so the
6 engineer that is designing the station would go out and
7 make sure that he would select the equipment, et
8 cetera, et cetera, and do the construction so that in
9 fact it would live the 30-year life.

10 Now, we are finding that the equipment
11 that we have got in place, et cetera, is capable of
12 living the 35 years or the 40 years. Some of the
13 equipment is in fact replaced after 10 years and the
14 same equipment would be replaced after 20 years and 30
15 years. But the average service life we found can be
16 extended beyond the 40 years.

17 Q. Yes, you have given that evidence,
18 Mr. Meehan. I was looking at something a little more
19 specific.

20 Mr. Burpee, I just want to make sure I
21 understood. You were talking hours of operation, but
22 isn't your direct evidence that the initial specified
23 life of all of your existing coal-fired stations was 30
24 years. I mean, that's what they were designed for,
25 that's what you planned for, and that's what the DRC,

1 that's what they recommended.

2 MR. BURPEE: A. That's correct.

3 Q. And my question is: All of that is
4 significant with respect to life extending a unit;
5 isn't that fair?

6 A. I would say that's fair. The CEGB,
7 the one I quoted you before, they did say they had a
8 design life 150,000 hours they took to 300,000 hours.

9 Q. Well, they haven't reached 300,000
10 hours yet have they?

11 A. Well, certainly they have a lot of
12 units well over 200,000 hours.

13 Q. We are getting back to what Panel 2
14 was talking about, the risk, it's a gamble, it's a
15 judgment, and we just don't know right now; isn't that
16 fair?

17 MR. MEEHAN: A. I think there certainly
18 are risks associated with the life extension.

19 Q. Just about to leave the DRC,
20 Depreciation Review Committee, is there a 1991 report?

21 A. I understand there is a draft report.

22 Q. Do you know what the conclusion is
23 with respect to service life?

24 A. I have heard rumours that they are
25 staying with a --

1 THE CHAIRMAN: Hold it, I don't think we
2 should get the rumours. That's not something we want
3 to hear about.

4 MR. MEEHAN: I have not seen the report,
5 I'm sorry.

6 MR. WATSON: Q. You don't know if there
7 is a corporate decision on service life?

8 MR. MEEHAN: A. Not yet.

9 Q. It hasn't been communicated to you
10 anyway.

11 A. No. I understand it's still being
12 considered.

13 MR. WATSON: I assume, Mr. Chairman, that
14 Hydro will produce that report when it becomes
15 available and there is no difficulty with that.

16 MRS. FORMUSA: It will certainly be ready
17 for the OEB. If the request is that it be made
18 available in these proceedings as well, certainly that
19 can be accommodated.

20 THE CHAIRMAN: Thank you, Mrs. Formusa.

21 MR. WATSON: Mr. Chairman, when that is
22 produced it may have some significant information which
23 bears on this. We may ask to ask more questions either
24 through this panel or try and resolve it through the
25 interrogatory process or some other means.

1 Q. If you could turn to Volume 16,
2 please, page 2852.

3 Panel, you will see there at the top of
4 the page, the panel is giving what are now the famous
5 four factors for determining the life of the units.
6 There was considerable testimony on that in Panel 2, I
7 don't propose nothing through that.

8 Near the bottom of the page, line 22 the
9 question is:

10 "How exactly do you go about
11 determining the life of these units?"

12 The answer is: "Periodically, we will do
13 studies of the need for and the economics
14 of a particular station on the generating
15 system. In addition to that, Hydro has a
16 Committee called the Depreciation Review
17 Committee, who, basically, review the
18 life of all of Hydro's assets."

19 Now, I will be talking about the studies
20 in a little while, and if you can just remember the
21 first sentence of that answer.

22 Finishing off the Depreciation Review
23 Committee, if you go down that page further, the next
24 question is:

25 "Are these judgments subject to the

1 any kind of a verification?"

2 The answer is yes, and they are verified
3 in four ways and the four ways are listed.

4 So, Mr. Meehan, I guess it's fair to say
5 that if there has been no Depreciation Committee report
6 with respect to extending service lives, then obviously
7 there cannot have been these four verifications of that
8 report; is that fair?

9 MR. MEEHAN: A. Well, I am a bit
10 bothered, I guess. The Depreciation Review Committee
11 is in fact a committee to determine the depreciation of
12 capital assets. It's not necessarily a committee that
13 would establish the lives to be used for planning
14 purposes. Very often, and most of the time, those two
15 functions are in agreement.

16 If we go the route that we are going, as
17 we did between 1984 and '89, then we are going to have
18 a difference in what is used for planning purposes and
19 what is used for depreciation purposes, or rate-setting
20 purposes.

21 Q. Yes, I think you made that point
22 before.

23 My simple question was: Without a report
24 there is not going to be that verification that Mr.
25 Taborek was referring to; isn't that fair?

1 A. Without a report we are not going to
2 have the verification that Mr. Taborek was referring
3 to.

4 Q. Now, if you could turn to
5 Interrogatory 9.9.21, which is at page 23 of Exhibit
6 479.

7 Mr. Register, if I could have a number
8 for that.

9 THE REGISTRAR: That will be 475.9.
10 ---EXHIBIT NO. 475.9: Interrogatory No. 9.9.21.

11 MR. WATSON: Q. Panel, you will see that
12 this interrogatory shows the projected expenditures for
13 fossil stations in various components from 1991 to the
14 year 2000, the bottom row of that is entitled "Cap Mods
15 Fossil", that's capital modifications for the fossil
16 plants. I assume, first of all, that that is beyond
17 rehabilitation and specific environmental controls; is
18 that fair?

19 MR. BURPEE: A. Yes, it is.

20 Q. Could you tell me what is included in
21 capital mods?

22 MR. MEEHAN: A. Capital modifications
23 are any modification to the plant itself or to the
24 equipment inside. So within that area there could be
25 replacement of boiler tubing, reheater, super heater.

1 A lot of that capital there was for Nanticoke, it could
2 be partial change out of control system, items like
3 that.

4 Q. It is beyond ordinary OM&A?

5 A. It is beyond OM&A. It has its own
6 definition or classification for what is required to be
7 capital. They are set rules for that.

8 Q. What you mean by capital is just
9 large expenses beyond the normal running or daily
10 maintenance costs?

11 A. Well, capital I guess by definition
12 is you recover the costs over a period of time as
13 opposed to expensing it one year.

14 Q. Could you tell me how these figures
15 are affected by the update?

16 A. Actually, I can't tell you right now
17 because we are just going through that process at this
18 time.

19 Q. Could you give me an undertaking to
20 provide that information when it is available?

21 A. I guess the timing, to fully
22 depreciate that, will be after the business planning
23 cycle is complete and that's --

24 MR. MEEHAN: A. Almost a year from now.

25 MR. BURPEE: A. Almost a year from now

1 by the time it's accepted corporately. Work is it
2 being identified now by the station and then it has to
3 be accepted by the branch and worked out within the
4 branch and then it goes through a few reiterations and
5 it's also impacted on energy, by energy forecasts as
6 well.

7 Q. So what you are saying you won't know
8 the effect of the update on this expenditure for
9 another year?

10 A. Won't know, yes, the approved impact.
11 Because another factor in here is the required
12 reliability as well.

13 Q. Very much so.

14 A. Yes.

15 Q. And as you know, my client is quite
16 concerned about that.

17 A. Yes.

18 MR. MEEHAN: A. And the availability of
19 capital. There is a number of things that could affect
20 these numbers over the next 10 months.

21 Q. Okay. So your evidence is that you
22 are you just don't know the effect of the update on
23 these numbers?

24 A. Are you referring to just the bottom
25 line?

1 Q. Well, I am talking about the capital
2 modifications right now. If you want we can go through
3 all of the lines but that was the one that I wanted to
4 key on right now.

5 A. I would expect that these numbers
6 would increase a little bit, directionally they would
7 increase a little bit to cover off the kinds of things
8 that we have been talking about with respect to life
9 management that are not included. Some of the life
10 management costs are capital, some are OM&A, and as
11 near as I know, those costs wouldn't be included in
12 last year's business planning process which is the
13 basis for these numbers.

14 [10:37 a.m.]

15 Q. So are life management costs part of
16 capital modifications?

17 MR. BURPEE: A. Right now some of the
18 repair work will be.

19 Q. So some --

20 A. Or the change-outs. The inspection
21 requirements on an ongoing basis is OM&A, it's not on
22 this line, and that's going in the current business
23 plan: the incremental costs above what we do already.

24 The capital reinvestment which is what
25 capital mods is becoming, a lot of work for Nanticoke

1 is in here. This is not all committed capital; a lot
2 of it is uncommitted. What we think will be required
3 but has not been up to the point of being committed.
4 And a lot of that you would refer to as Nanticoke life
5 management, so there is an element in there.

6 Depending on the required reliability for
7 the stations, the amount of energy required, and I
8 guess the availability of capital, that bottom line
9 will certainly change. It is quite possible it could
10 shift to the right to the later years. There could be
11 a reduction in the near term, increase in the long term
12 or it might not change at all.

13 Q. So two things --

14 A. We really don't know right now.

15 Q. So Mr. Burpee, first of all you said,
16 as I understand it, that reliability is a function of
17 what these figures are; is that correct?

18 A. I am not sure -- reliability is a
19 function of the figures or the required reliability
20 drives some of the figures? In other words, if there
21 is not cost of unreliability; in other words, if the
22 cost of whether it's 10 per cent DAUFOP or 11 per cent
23 DAUFOP, if there is no cost to the corporation at the
24 time, it's hard to justify a project to reduce DAUFOP 1
25 per cent.

1 Q. But conversely if you make a decision
2 corporately that you are going to have reduced
3 reliability, that impacts on these numbers?

4 A. Yes.

5 Q. And you have made that decision,
6 certainly on Lambton, that there is going to be reduced
7 reliability at those units?

8 A. We have accepted it, yes.

9 Q. That decision has been made; isn't
10 that fair?

11 A. But it is reviewed on a regular
12 basis.

13 Q. Well, that's a reality as you
14 testify?

15 MR. MEEHAN: A. The decision that has
16 made --

17 Q. Excuse me, Mr. Meehan, I asked Mr.
18 Burpee a question. I would be pleased to hear your
19 question after I have heard Mr. Burpee's.

20 MR. BURPEE: A. It was a decision last
21 spring, I guess. Again it is being reviewed. It's in
22 the process of being reviewed right now as we speak.

23 Q. But that's a reality today as I ask
24 you this question?

25 A. Yes.

1 Q. Thank you.

2 Mr. Meehan?

3 MR. MEEHAN: A. I think I said
4 yesterday, and maybe I should repeat it today, is that
5 the decision that was made at Lambton when we cut back
6 the scope at Lambton to keep the capital cost down, the
7 unreliability went up, so the units will be less
8 reliable. And as part of that package that gained
9 corporate approval was the concept that additional OM&A
10 and capital mods would have to be spent in the order of
11 \$9 million a year to maintain the poorer level of
12 reliability. So the lower capital cost plus the higher
13 annual cost was the package that was sold.

14 Q. The first issue was reliability; the
15 second was life management, and you indicated that
16 certain of the life management expenses are going to be
17 capital modifications and will be included in this
18 figure?

19 MR. BURPEE: A. That's correct.

20 Q. What I am getting from this is right
21 now you just do not have a figure, you just don't know
22 precisely the effect of the update on this. You are
23 making some assumptions, but you don't have any
24 studies. You just don't know how the update is going
25 to affect us; isn't that fair?

1 A. That's correct.

2 DR. CONNELL: In this table what is CPM,
3 please.

4 MR. BURPEE: That's the combustion
5 process modifications.

6 DR. CONNELL: Low NOx burners and --

7 MR. BURPEE: In this case it's low NOx
8 burners, yes.

9 MR. MEEHAN: Some of the projects in this
10 list are committed and have greater importance, I would
11 think, and some are not committed. The Lambton rehab
12 is committed. The Lakeview rehab is committed. The
13 Lambton FGD is committed. But below that line, none of
14 the other projects are committed. We are spending some
15 money on the preliminary work for Lakeview ash
16 management; we are spending some money on the Lennox
17 dual fueling; and we are spending some money on the
18 Lambton CPMs; and we are spending, I imagine, some
19 money in the capital mods fossil. That's a catch-all
20 for a number of jobs at a number of stations that just
21 haven't been identified yet as projects. So there is a
22 number of ideas.

23 Certainly, as Mr. Burpee has pointed out,
24 most of that is for Nanticoke, but Thunder Bay and all
25 sorts of things are included in that line. None of it

1 except a small amount of work for Nanticoke life
2 management has been committed.

3 MR. WATSON: Q. Mr. Meehan, you
4 mentioned OM&A, and I would like to turn to that if I
5 could briefly. On the next page, page 25 of Exhibit
6 479, there is Interrogatory 2.9.12.

7 Mr. Registrar, if I could have a number.

8 THE REGISTRAR: 475.10.

9 ---EXHIBIT NO. 475.10: Interrogatory No. 2.9.12.

10 MR. WATSON: Q. You will see that
11 interrogatory asked for OM&A data for the last five
12 years. So if you turn to the page to 26, you will see
13 the response given under three headings: the hydraulic
14 stations, the fossil stations, and the nuclear
15 stations. I would like to key just in on the top three
16 fossil stations: Lakeview, Lambton and Nanticoke.

17 I take it you will agree with me that
18 there were substantial OM&A cost increases between 1986
19 and 1989?

20 MR. MEEHAN: A. Yes, I think I would
21 agree with that.

22 Q. And that's even taking into account
23 that these are dollars of the year? This is a real
24 increase?

25 A. These are in dollars of the year,

1 yes.

2 Q. So what we are talking about here is
3 there is a substantial real increase.

4 A. Well, I think I would refer to a real
5 increase as one that would see an increase but was in
6 fact all in the dollars of one year. That is what I
7 would think is a real increase.

8 Q. I don't want to get too technical.
9 This increase is not because of inflation. This is an
10 increase because you had higher OM&A requirements and
11 you had to devote more money to your OM&A; isn't that
12 correct?

13 A. It looked like these increases would
14 exceed the general rate of inflation.

15 DR. CONNELL: Which years are we
16 comparing?

17 MR. WATSON: 1986, sir, to 1989, Dr.
18 Connell. Just for instance on Lakeview, Mr. Meehan,
19 you see it starts at about 35 million and ends at about
20 54-million. That is about a \$20-million increase from
21 the 1986 value of 35 million. So we are talking about
22 a substantial increase.

23 Now if you turn the page to interrogatory
24 2.7.45. Mr. Registrar?

25 THE REGISTRAR: That's 475.11.

1 ---EXHIBIT NO. 475.11: Interrogatory No. 2.7.45.

2 MR. WATSON: Q. That interrogatory asks
3 for the current projections on OM&A. And the graph is
4 on the next page, that's page 28, and again if we could
5 just focus in on the three fossil stations we have been
6 dealing with: Lakeview, Lambton and Nanticoke, you
7 will notice that, first of all, these figures are in
8 1990 dollars and for Lakeview there, in effect, is no
9 increase between 1990 and the year 2000. The numbers
10 are roughly the same? You will notice the numbers for
11 Lambton and Nanticoke increased. However, if you look
12 at the interrogatory on the next page, that's 8.9.16,
13 Mr. Registrar?

14 THE REGISTRAR: That is .12.

15 ---EXHIBIT NO. 475.12: Interrogatory No. 8.9.61.

16 MR. WATSON: Q. You will see that the
17 MEA asked --

18 THE CHAIRMAN: Actually it is .61, not
19 16.

20 MR. WATSON: Yes, Mr. Chairman, I
21 misspoke myself. 8.9.61.

22 Q. You will note that the MEA asked
23 about the increases in the OM&A costs, and those
24 increases are due to the expected additions of the
25 scrubbers at those two units.

1 So taking out the scrubbers, we basically
2 have constant OM&A predicted through the year 2000 on
3 this chart; is that correct?

4 MR. MEEHAN: A. Yes, roughly constant.

5 Q. In fairness to you, you have
6 testified that there is going to be a 7.5 per cent
7 increase in variable OM&A and my question is: That
8 would be applied to these figures; is that fair?

9 MR. BURPEE: A. Well, of course, these
10 are old figures. But it is in addition to the
11 expenditures we are talking here.

12 Q. Are you telling me there is an update
13 to these figures?

14 A. Well, what I am saying, this is 1990
15 business plan budget guidelines, 1991 budgets. We now
16 have a 1992 budget which is only in detail for two
17 years and the business plan is in process right now.

18 It's hard to compare all these numbers
19 because you also have to take into account the energy
20 requirements of each year as well which plays a
21 significant factor to the cost.

22 Q. Mr. Burpee, if there are updates for
23 these figures, would you produce them, please.

24 MR. MEEHAN: A. No, there are no
25 updates. I think what we are saying is that the

1 concept that we are talking about with respect to life
2 management and the additional 7-1/2 per cent would
3 theoretically be on top of the numbers that are shown
4 here, but they would not be 7-1/2 per cent of these
5 numbers.

6 Q. No, sorry, I wasn't trying to imply
7 that they were. The 7-1/2 per cent that you were
8 talking about would be addition to these numbers?

9 A. Would be addition to whatever numbers
10 these would represent under the current circumstances,
11 which--

12 Q. And you don't know what they are?

13 A. --have not been calculated yet.

14 Yes, that's true.

15 DR. CONNELL: What are the relevant years
16 for the 7-1/2 per cent?

17 MR. BURPEE: 1993 you will start to see
18 it, depending on the station.

19 DR. CONNELL: All at once?

20 MR. BURPEE: I am trying to think of how
21 we have worded it in the update. I believe it starts
22 immediately, does it not say that?

23 MR. MEEHAN: It does say that.

24 MR. BURPEE: Yes, it implies that it
25 would start immediate, which for us would be 1993.

1 DR. CONNELL: This is a one time only --

2 MR. BURPEE: Yes, that's an estimate of
3 the costs to have this program in place at all
4 stations. They would be one shot and that would be the
5 continuing cost of it.

6 DR. CONNELL: I understand.

7 Could I just, while I have got my
8 microphone on, go back to the first in this series.
9 That's Mr. Watson's page 26.

10 Mr. Meehan, I understood you to be
11 agreeing with Mr. Watson that the increments reported
12 here between '86 and '89 were in excess of the normal
13 index of inflation?

14 MR. MEEHAN: They appear to me to be,
15 yes, just looking at it. Some of the years might be in
16 the order of inflation but other years are higher than
17 that.

18 DR. CONNELL: But in fact if you looked
19 at the particular purposes of these expenditures, they
20 might or might not exceed the natural price increases
21 in those goods and services.

22 MR. MEEHAN: That's correct. The
23 utilization at the stations increased from 1986 to
24 1989. I think Mr. Smith used a graph which would have
25 shown that the amount of fossil energy produced from

1 1986 to 1989 would have increased.

2 DR. CONNELL: So this might only be
3 proportional to that increased production.

4 MR. MEEHAN: It may well be. I don't
5 think you can draw too many conclusions from these
6 figures.

7 DR. CONNELL: You would need to analyze
8 it in more detail?

9 MR. MEEHAN: Yes.

10 MR. BURPEE: Energy has played a
11 significant part in the increase in costs, the increase
12 in energy.

13 DR. CONNELL: Thank you.

14 MR. WATSON: Q. You are saying that
15 there was an increase in energy?

16 MR. BURPEE: A. From '86 through '89,
17 yes.

18 MR. MEEHAN: A. If you look at Mr.
19 Smith's slide, which is Exhibit 474, the slide that he
20 used, the overhead he used S1.

21 Q. Yes, I have that. Thank you.

22 [10:50 a.m.]

23 A. You can see by looking at that that
24 the actual part of that curve shows about 24
25 terawatthours of fossil energy production in 1986,

1 increasing to about 45 -- 35, I am sorry, terawatthours
2 in 1989. That would contribute to some of the increase
3 that we are seeing.

4 Q. Mr. Meehan, I guess my confusion
5 stems from an interrogatory that I looked at. I didn't
6 think this was an issue so I didn't put it with my
7 package. You may not have it in front of you in which
8 case I will give you mine to look at. It's
9 Interrogatory 2.14.89.

10 THE CHAIRMAN: Better give that a number.

11 THE REGISTRAR: 2.14.89, that will be
12 .13.

13 ---EXHIBIT NO. 475.13: Interrogatory No. 2.14.89.

14 MR. WATSON: Q. Let me read the
15 interrogatory and perhaps you can tell me if I am
16 interpreting it correctly. It's not long. The
17 question is: Please provide the following data for
18 each year from 1980 to 1990: (a) kilowatthour
19 generated from distillate oil, residual oil and coal.
20 And it goes on (b) barrels. (a) is what I wanted to
21 concentrate on. Just for completeness I will read the
22 rest.

23 Barrels of distillate and residual oil
24 and tonnes of coal consumed. (c) fossil
25 fuel cost divided into distillate oil,

1 residual oil and coal fuel. (d) average
2 inventory of distillate, residual oil and
3 tonnes of coal. (e) value of average
4 inventory divided into distillate oil,
5 residual oil and fuel oil.

6 The response (a) says net megawatthours
7 generated from distillate oil, residual oil and coal,
8 and it gives a graph, and as I said, I will give this
9 to you so you can review it, it gives a table stating
10 the years and the amount of megawatthours under three
11 columns, distillate oil, residual oil and coal. For
12 1984 it has the value of 37 million megawatthours, and
13 your graph shows -- and 37 million megawatthours is 37
14 terawatthours. There is no question about that.

15 MR. BURPEE: A. No, that's correct.

16 Q. Your graph shows something different.
17 In 1985 it goes from 37 down to 29, from '86 it goes
18 down to 23.

19 MR. MEEHAN: A. 1985 isn't shown on the
20 graph that I am referring to.

21 Q. I'm sorry, you are quite right. I am
22 starting in 1984, it as 37; '85 is 29; '86 is 23; '87
23 goes up to 31; '88 is 34, '89 is 34 and '90 is 26.

24 THE CHAIRMAN: That's consistent,
25 eyeballing the graph.

1 MR. SMITH: It's almost exactly with what
2 we have on the graph, I believe.

3 MR. WATSON: Q. Isn't there an increase
4 from '88 to '89 in your graph?

5 MR. SMITH: A. A very light increase.
6 It might have gone from 33.1 to 33.6, or something.
7 The graph isn't that accurate.

8 Q. This shows 34.3 down to 34.0.

9 A. You would have to add up on your
10 graph all the information. Our says quite clearly
11 fossil generation, not just coal, but we said it was
12 illustrative of coal because that is the major fuel we
13 use.

14 I think in '89 there may have been a fair
15 amount of oil generation. If fact, I know there was a
16 fair bit of oil generation in 1989, that was the year
17 we had a problem at Lennox.

18 MR. MEEHAN: A. I think too if you look
19 at your cost figures for '88 and '89 at Lambton, for
20 instance, not knowing where this little bit of extra
21 energy might have come from, the increase in that year
22 is probably in the order of inflation or lower.

23 MR. BURPEE: A. For '88 to '89 there was
24 a significant increase at Lakeview which explains most
25 of it.

1 Q. We were dealing with Interrogatory
2 2.7.45, which was the OM&A costs that are projected
3 into the future. We have now experienced 1990 and
4 1991. Do you have actuals for those figures?

5 A. For '90 and '91?

6 Q. Yes.

7 A. Yes, they would be available.

8 Q. Could you produce those, please.

9 THE CHAIRMAN: 478?

10 THE REGISTRAR: 478.8.

11 THE CHAIRMAN: Thank you.

12 ---UNDERTAKING NO. 478.8: Ontario Hydro undertakes to
13 provide OM&A costs for 1990 and 1991.

14 MR. WATSON: Q. Now you have been
15 talking a 7.5 per cent increase in variable --

16 THE CHAIRMAN: I take it you will only
17 want it for Lakeview, Lambton and Nanticoke; is that
18 right?

19 MR. WATSON: I would appreciate it for
20 all of them. This panel is just dealing with --

21 THE CHAIRMAN: You want it for the
22 nuclear and fossil as well.

23 MR. WATSON: Yes. It would save making
24 an undertaking at a later panel.

25 THE CHAIRMAN: All right.

1 MR. WATSON: Q. Panel, you have given
2 evidence that the 7.5 per cent that was referred to in
3 the update was going to be added on to the OM&A costs.
4 You will recall in the earlier interrogatories that we
5 were dealing with, in particular the interrogatory on
6 page 18 of my material, that's 8.9.54, dealing with
7 Lambton, you will see the last sentence of that
8 interrogatory says as a result of the reduced capital
9 expenditures higher annual operating maintenance and
10 modification costs are expected.

11 Is the 7.5 per cent sufficient to account
12 for this?

13 MR. MEEHAN: A. No. That statement is
14 more relating to the \$9 million that we have been
15 talking about. But it would also include the 7-1/2 per
16 cent or that part of it that would be applicable to
17 Lambton.

18 This is part of the package that I was
19 talking about, the lower reliability, the lower capital
20 cost, the higher annual cost.

21 Q. So this statement is directly related
22 to the 9-million a year for Lambton and not the OM&A?

23 A. I think it would include both of
24 those.

25 Q. Both.

1 Panel, my question is the same for this
2 graph as it was for the graph dealing with capital
3 mods. You have given an estimate of 7.5 per cent, but
4 isn't the bottom line you just don't know what the
5 effect of the update is going to be on these numbers?
6 Isn't the answer the same, you don't know?

7 MR. BURPEE: A. No, we don't know
8 because the energy that comes out of the update also
9 will have an impact on the OM&A cost. You might have
10 an increase for life management cost, but if the energy
11 is reduced you have a decrease in other OM&A
12 expenditures.

13 Q. That's right. And it's not only
14 energy requirements; it's reliability requirements as
15 well?

16 A. That's correct.

17 Q. Now, if we turn to page 30 of Exhibit
18 479, that's Interrogatory 2.6.16.

19 THE REGISTRAR: .14.

20 ---EXHIBIT NO. 475.14: Interrogatory No. 2.6.16.

21 MR. WATSON: Q. That interrogatory asks
22 very simply if there were any studies with respect to
23 life extension, and the answer is:

24 There are no studies regarding
25 extending the lives of existing fossil

1 and nuclear generating stations beyond
2 their expected service lives.

3 I assume your evidence is that this is
4 still the situation and there are no studies; is that
5 fair?

6 MR. MEEHAN: A. Well, this interrogatory
7 and the response to it was prepared about a year ago
8 and certainly it was a statement at that time.

9 There are really no studies as such
10 available at this time, so we have a lot of information
11 that's been available to us in the meantime. But no, I
12 would have to agree that there is no studies.

13 Q. The closest thing that you expect is,
14 I assume, the latest DRC report.

15 A. Well, again, I am thinking of this
16 from a planning point of view rather than from a
17 financial point of view. There has been work done to
18 establish the approximate capital costs required, and
19 that's the \$3 million per unit that is in the update
20 and the 7-1/2 per cent of OM&A.

21 Q. Do you have studies with respect to
22 those?

23 A. There is information available that
24 permitted to us produce those rough estimates.

25 Q. Just so I am not confused, having

1 information available somewhere could range anywhere
2 from picking up the phone and calling someone and
3 getting some rough information to make some rough
4 estimates, to having a detailed study somewhere that
5 has been done with great care and you rely on to a
6 great extent. Now we are certainly not at the latter
7 end of that spectrum, are we?

8 A. No.

9 Q. What sort of information are you
10 referring to? Are there detailed cost estimates?

11 MR. BURPEE: A. The cost estimates for
12 the incremental OM&A, that's the 7-1/2 per cent of the
13 variable costs, is based on looking at what we are
14 currently spending at Nanticoke to do the inspections,
15 and then taking that value and saying if we do it on a
16 continuous basis over a long period of time what is the
17 impact of that. And we say it's the percentage of
18 variable costs because it is dependent on energy and
19 operating hours. Low utilization, there is less
20 metallurgical damage in terms of creep and a few other
21 mechanisms.

22 THE CHAIRMAN: In terms of what, sorry?

23 MR. BURPEE: Creep, creep damage.
24 Long-term creep is a failure mechanism of high
25 temperature components. That's the one thing that

1 usually determines the life of a boiler component is
2 quite often creep damage, it could also be fatigue.

3 THE CHAIRMAN: How do you spell that?

4 MR. BURPEE: C-R-E-E-P.

5 THE CHAIRMAN: Okay.

6 MR. BURPEE: I think you can visualize
7 that due to the high temperature, the material sort of
8 does creep, stretches and loses its strength.

9 So if the units don't operate as much,
10 the variable costs go down, less inspection is required
11 because the inspection program is based on operating
12 hours.

13 The capital reinvestment, and we have
14 called it capital but that doesn't necessarily mean it
15 will all be capital, it could be OM&A depending on
16 whether you are into an immediate repair or you are
17 planning a long-term replacement, is based on work that
18 was done for the thermal cost review for capital mods.
19 We have converted that into a reinvestment rate, an
20 annual reinvestment rate which is again what a number
21 of other utilities are looking at in the states to
22 determine reinvestment rates, annual rates to have an
23 idea of the annual capital that you would expect.

24 But you wouldn't actually go to release
25 any capital until you actually determined there was a

1 need and that it was economically justified.

2 MR. MEEHAN: If I might add, this is the
3 \$3 million per unit and it is an average expected over
4 the remaining life of the station.

5 There may be no expenditures for three or
6 four years and then there may be a \$30 million
7 expenditure that would carry it the rest of the time.

8 These estimates are rough but they are
9 what we would expect to have to spend over the
10 remaining life that we are looking at.

11 MR. WATSON: Q. That was exactly the
12 question I was going to ask you. These are rough
13 estimates and there are no studies to support them.

14 MR. MEEHAN: A. There are no detailed
15 studies to support them.

16 Q. Now, the Chairman asked you about the
17 retirement of these units, and we saw yesterday in the
18 DSP that at figure 4-12, that you had detailed dates
19 for the retirement of all of your units in the planning
20 horizon. Just so there is no confusion, today there
21 are no retirement dates for these units that you are
22 planning on life extending; isn't that correct?

23 A. At the two stations, that's correct,
24 except that they are beyond 2014.

25 Q. Yes. And the decision on a

1 retirement date of a unit is affected by, among other
2 things, the extent and the cost of environmental
3 controls; isn't that fair?

4 A. Yes.

5 Q. Now, talking about retirement dates
6 of units, I believe, Mr. Burpee, you testified that a
7 number of utilities currently plan on a life of at
8 least 50 years for fossil and that the decisions are
9 economic. Is that a fair summary of your evidence?

10 MR. BURPEE: A. That's correct.

11 Q. Now, at Volume 16, page 2865, again
12 this is Hydro's direct evidence, and 2865 is the
13 continuation of an answer that starts on the previous
14 page. Your counsel asked the question:

15 "Why not plan on keeping the existing
16 units longer than their current forecast
17 service lives?"

18 Feel free to read the bulk of the answer.
19 What I am interested in is what is on page 2865, the
20 last three paragraphs, which I will read into the
21 record.

22 "Now, we do not believe that it's
23 appropriate to plan on the basis of a
24 longer life than that. It would be
25 exceedingly risky to do so. We have done

1 some investigation of other utilities'
2 practices and we tend to find, very
3 frequently, lives less than we are using.

4 "There is little or no experience with
5 the operation of modern, high pressure
6 plants and nuclear plants for long
7 periods of time. We basically don't know
8 that they can be economically maintained
9 for more than 40 years.

10 "We are focusing our attention now in
11 attempting to determine whether or not we
12 can get them to last for 40 years. There
13 is a high degree of controversy and
14 uncertainty in that, and going beyond,
15 you are taking one further step into the
16 unknown."

17 With respect to that specific point about
18 the life of the units, Mr. Burpee, you said a number of
19 utilities are looking at 50 years. This evidence seems
20 to indicate that investigation was done and that
21 investigation revealed results where the lives were not
22 only not 50, they weren't even 40.

23 Can you help me out with the difference
24 there?

25 A. The only information I have seen was

1 a review done since Panel 2 testified where we contact
2 add few utilities in the United States.

3 Q. I'm sorry how many?

4 A. I said a few. I think there was -- I
5 can't recall. There was maybe four or five, and found
6 out what they were doing.

7 The one thing that we do find out, that a
8 number of them, although they planned on lives of 50
9 years or more, they depreciated over 35. It seemed to
10 be a standard practice.

11 Q. Well, Mr. Burpee, could you provide
12 me with a list of the utilities that you were referring
13 to in your evidence, the lives that they are planning
14 on and their rationale for doing life extension, and
15 also while you are at it could you provide me with the
16 background for the statement in Panel 2, in effect, the
17 results of that investigation that's mentioned there?

18 Can I have an undertaking for that, Mr.
19 Chairman.

20 THE REGISTRAR: 478.9.

21 ---UNDERTAKING NO. 478.9: Ontario Hydro undertakes to
22 provide a list of the utilities contacted
23 in the review mentioned by Mr. Burpee,
24 the rationale for doing life extension,
25 and background for the statement in Panel
2, the results of that investigation
mentioned on line 7 of page 2865 of
transcript.

1 THE CHAIRMAN: Reference to the
2 investigation is on line 7 of page 2865; is that right?

3 MR. WATSON: Yes.

4 THE CHAIRMAN: I believe that was the
5 evidence of Mr. Taborek. I am not absolutely certain
6 but it looks as if it was. Mrs. Formusa is nodding, so
7 I take it as being right.

8 MR. WATSON: That's my understanding in
9 looking at the transcript, Mr. Chairman, that it was
10 Mr. Taborek's evidence. I assumed that it wouldn't be
11 difficult for Hydro to get the results of that
12 investigation incorporated in this same undertaking.
13 Perhaps we could use the same process, if in fact there
14 is some difficulty they could come back and approach
15 the Board.

16 [11:12 a.m.]

17 MR. WATSON: Q. What you were talking
18 about, Mr. Burpee, is a life of 50 years, a number of
19 utilities are planning on that, and that the decisions
20 are now economic.

21 Isn't it fair to say that if you don't
22 know the life of the unit, if you are not planning to a
23 particular life, then you really can't have a good
24 grasp on what the costs are going to be? You can make
25 what you have done now, a rough estimate, but you

1 really can't say what the costs are. If you can't say
2 what the costs are, then isn't the whole issue of
3 economics still up for grab?

4 MR. BURPEE: A. No, because life
5 management process allows you to evaluate the economics
6 on a regular basis and project 10, 20 years down the
7 road if you like, or 25, which again some other
8 utilities do in terms of where they are going and what
9 is required, and you can evaluate that costs against
10 the costs of other options.

11 You have enough lead time to make
12 different decisions.

13 Q. If I could refer you to your evidence
14 in Volume 108, page 18940, the answer that starts at
15 line 7. Your counsel was asking you what are the
16 benefits that are perceived for life management, and
17 you proceed to describe that. And then your conclusion
18 in that paragraph, the last sentence is:

19 "In other words, if we know where we
20 are and we know what is required, we will
21 have a better idea of what it will cost
22 to get there."

23 Well, what is required is extending a
24 unit to a certain life. Also what is required is
25 knowing its energy projection and also what is required

1 is knowing what reliability it is going to be working
2 at. If you don't know those, you are not going to have
3 a good idea of what your costs are. That's just basic
4 common sense; isn't that true?

5 A. Well, I don't agree that whether the
6 requirement to extend the life or not is not a factor.
7 The factor is how many more years do you have to
8 operate? From the station's perspective, as I have
9 already outlined, whether it is to year 40, 50, 60,
10 whatever, what we are looking at is where we are now
11 and where we are going, whether it is ten or 20 years
12 down.

13 The business planning process is a
14 ten-year process and we look at an energy projection
15 for ten years, a reliability requirement for ten years,
16 and a cost to achieve performance results for ten
17 years.

18 Q. So are you telling me you are now
19 looking at in effect a ten-year extension, you are now
20 looking at a 50-year life?

21 A. No, what I am saying is that each
22 year what we review in the station is the costs to
23 achieve certain performance results over the next ten
24 years. This has to be encompassed in the overall
25 planning process where you might want to look farther

1 down the road to determine the economics and what's
2 required.

3 Q. But Mr. Burpee, those ten years, that
4 doesn't take us anywhere near the end of the life of
5 these units, does it?

6 A. Well, if I take my own units ten
7 years, Unit 1 will retire.

8 Q. We are talking the life extended
9 units. We are talking Lambton and Nanticoke. That
10 doesn't take us anywhere near the end of the life of
11 those units.

12 MR. MEEHAN: A. The life management
13 process is an ongoing thing, and I think what Mr.
14 Burpee is saying is that right now he is looking at ten
15 years; and three years from now, he will be looking at
16 another ten years; and ten years from now, he will be
17 looking at ten years beyond that. And that's the
18 beauty of a life management program.

19 Q. Mr. Burpee, you have told us that the
20 key to the process is to know the requirements of the
21 plant when you are talking about life extension. You
22 have already told us you don't know what the energy
23 production is going to be, you don't know what the
24 reliability is going to be, the efficiency. You have
25 told us that there are environmental regulations that

1 are important and can impact on the plant.

2 Given all of that, I would like to take
3 you to your conclusion of your testimony which is at
4 Volume 108, page 18943. You will see your answer
5 starts at line 3 and proceeds down through four
6 paragraphs and then concludes on line 15. Please feel
7 free to read the whole answer and anything put in
8 context.

9 The conclusion that you give is that
10 "continued service beyond 40 years is technically
11 feasible and has potential to be economically feasible"
12 and you give two reasons. You say, given no
13 substantial improvement in cycle efficiency and the
14 cost of building new stations.

15 Just looking what reality was when Panel
16 2 testified and what reality is today, there has been
17 no difference in cycle efficiency, and Hydro has no
18 increased knowledge with respect to cycle efficiency
19 between Panel 2 and today; isn't that fair?

20 MR. BURPEE: A. I am really not sure
21 what analysis had been done prior to Panel 2. From my
22 perspective it has not been significantly changed.

23 Q. The second one was the cost of
24 building new stations. No doubt your cost figures are
25 constantly updated, but there hasn't been any dramatic

1 change in the cost of building new fossil stations
2 between Panel 2's testimony and today; isn't that fair?

3 A. That's correct.

4 I think what is also implied, as Mr.
5 Meehan stated earlier, the significant change from
6 Panel 2, though, is that we have made a call on what
7 environmental equipment would be added and there is now
8 a price for that which was unknown at the time of Panel
9 2. It had not been determined.

10 Q. That's exactly what I was going to
11 turn to now, Mr. Burpee, some of the environmental
12 considerations, in particular the CO(2) consideration.

13 Perhaps Dr. Effer will want to
14 participate in this discussion as well.

15 Now as I read the update, Hydro is
16 looking at a target of 25 teragrams of CO(2) emissions
17 per year and that's based on stabilizing the 1990
18 levels by the year 2000; is that fair? Dr. Effer?

19 DR. EFFER: A. Yes.

20 Q. As I understand it, originally the
21 level was not based on a 1990 level but it was based on
22 a 1988 level; and, in fact, it was based on a 20 per
23 cent reduction from that 1988 level; is that fair?

24 A. That base year and that assumption on
25 carbon dioxide reduction was based on, at that time,

1 following the conference outcome that was held in
2 Toronto and the target that was expressed there.
3 Subsequently that was used for our study that was done
4 for Exhibit 40, the... What's it called --

5 Q. So originally the target --

6 A. So that was the Canadian adopted
7 target was the one which we have adopted in this
8 update.

9 Q. I understand that. I was just trying
10 to get a little historical significance for it. It is
11 the 1990 standard and that in effect came out of the
12 Toronto conference, and the Toronto conference was
13 looking at a 20 per cent reduction from '88 levels?

14 A. Correct, yes.

15 Q. I understand that there is a
16 conference on global warming this summer, United
17 Nations conference; is that correct?

18 A. That's correct.

19 Q. They of course will be looking at
20 CO(2)?

21 A. Yes.

22 Q. Hydro's position is that they are now
23 starting to anticipate environmental regulations. Is
24 it fair to say that there might be a tightening of
25 CO(2) regulations recommended at this conference?

1 A. There has been some suggestion that
2 there will be protocols agreed to on reaching some
3 level of CO(2) emissions, but I don't have any further
4 information on what is expected there.

5 Q. Just using the 20 per cent figure
6 that was originally associated with the 1988 levels, if
7 in fact there was a 20 per cent reduction tacked onto
8 the 1990 level, that would give you a target of 20
9 teragrams instead of 25; is that fair?

10 A. Correct -- a different base year. I
11 am not sure the difference between the CO(2) emissions
12 between '88 and '90. There may be a very small
13 difference there.

14 Q. Well, just so we are not confused --

15 A. If you assumed the same base year,
16 yes.

17 Q. Yes. I was assuming 1990 base year.

18 A. Yes, that's correct then.

19 Q. Now in looking at Exhibit 452, I
20 assumed that the CO(2) emissions which are referred to
21 there only include Hydro's programs; is that correct?

22 A. Correct.

23 THE CHAIRMAN: What page on 452 are you
24 looking at?

25 MR. WATSON: The actual recommendation is

1 at page C2 of the appendix, of Appendix C, near the
2 back of the document, Mr. Chairman. About
3 three-quarters of the way down the page, there is a
4 heading entitled "CO(2) Emissions".

5 THE CHAIRMAN: Right. Thank you.

6 MR. WATSON: Q. But Dr. Effer, I wasn't
7 just referring to this particular page. The whole
8 thrust of the update as it applies to Hydro's programs;
9 it doesn't apply to anything outside of Hydro; is that
10 fair?

11 DR. EFFER: A. This is confined to
12 Hydro's plan, yes.

13 Q. Yes. In fact there are other
14 programs in Hydro's plan that are outside of Hydro's
15 control that do contribute to CO(2) emissions. Two
16 examples would be NUGs, for instance, and there is a
17 potential for the fuel switching program to contribute;
18 is that fair?

19 A. Yes.

20 Q. Now, I understand that the NUG
21 division is trying to estimate the contribution of
22 CO(2) at this time. Can you tell me if there has been
23 any progress made on that?

24 A. I can't, no. I can't myself, no.

25 Q. I assume you are the expert on the

1 panel. If you don't know, I assume no one else knows.

2 You can confirm that there is work under
3 way to try and estimate that though, can you?

4 A. The question again, sorry?

5 Q. To try and determine the contribution
6 of NUGs to CO(2) emissions?

7 A. Are you asking me to confirm that
8 there is a study going on?

9 Q. Yes.

10 A. I don't know.

11 THE CHAIRMAN: I thought you said a
12 moment ago that you confirmed there was. Perhaps I am
13 a little confused. I thought you answered
14 affirmatively to that.

15 MR. WATSON: Perhaps we can make it an
16 undertaking, Mr. Chairman.

17 Q. Could you find out for us, Dr. Effer,
18 if Hydro is engaged in studies to determine the
19 contribution of NUGs to CO(2) emissions?

20 DR. EFFER: A. Yes.

21 THE REGISTRAR: 478.10.

22 ---UNDERTAKING NO. 478.10: Dr. Effer to find out
23 whether Hydro is engaged in studies to
24 determine the contribution of NUGs to
25 CO(2) emissions; and if studies are
being undertaken by Hydro, for Hydro to
let MEA know and to produce the studies
when they are ready.

1

2

MR. WATSON: And, of course, Mr.

3

Chairman, if there is a study to produce that study.

4

5

6

7

Q. The same question with respect to
fuel shifting, Dr. Effer. Do you know if there are any
studies under way to determine the net effect of fuel
switching with respect to CO(2) emissions?

8

9

MR. DAWSON: A. No, I don't know of
those studies.

10

11

MR. SHALABY: A. If I can be of some
assistance to the previous undertaking.

12

Q. Okay.

13

14

15

A. The CO(2) from NUGs is in Exhibit 4.
There is an estimate of CO(2) annual atmospheric
emissions from NUGs.

16

17

Q. Are you referring to figure 4-1, Mr.
Shalaby?

18

A. I am. Of Exhibit 4.

19

20

21

22

Q. Perhaps you haven't read the
transcript in Panel 5. I believe the evidence of the
NUG panel was that this figure is no longer
appropriate.

23

24

25

A. There are updates of course but that
sort of gives you an order of magnitude of what NUGs
are.

1 Q. So this is still appropriate then?

2 A. It is not still appropriate but we
3 have addressed that issue and quantified with the CO(2)
4 of the NUGs that were current in 1989. If what you are
5 looking for is the exact update, then the undertaking
6 stands.

7 THE CHAIRMAN: It may have been a subject
8 matter of a discussion in Panel 5. I just don't
9 remember. I think it was.

10 DR. CONNELL: Yes.

11 MR. WATSON: I believe I spent some time.
12 talking about it, Mr. Chairman.

13 THE CHAIRMAN: Did you get the same
14 undertaking there then? [Laughter]

15 MR. WATSON: I'm not sure I did, Mr.
16 Chairman. I will have to go back and look at that.
17 I'm not sure Mr. Brown was as forthcoming.

18 The same undertaking. Perhaps we could
19 tack on to this, Mr. Chairman. If in fact there are
20 any studies with respect to the fuel substitution
21 program and its contribution to CO(2), could we know
22 about that and have the studies produced when they are
23 ready. Could we just make that part of the same
24 undertaking?

25 THE CHAIRMAN: Yes.

1 MR. WATSON: Thank you.

2 MR. SHALABY: The fuel substitution, I
3 think we mentioned that in Panel 4, not that we are
4 going to talk history, but it is always meaningful to
5 say in what context. Fuel substitution will increase
6 CO(2) at the residential level, for example, but it
7 will reduce CO(2) at Hydro's stations.

8 MR. WATSON: Q. Yes. And in fairness to
9 you, Mr. Shalaby, it's also a function of what it's
10 displacing; isn't it?

11 MR. SHALABY: A. That's right.

12 Q. What Hydro mixes, it is displacing?

13 A. Yes. And I think the testimony --

14 Q. I guess that's why it is so important
15 that we have some sort of a study to try and determine
16 what effects is, especially in light of the fact that
17 the CO(2) regulations are anticipated and Hydro is now
18 anticipating environmental regulations?

19 A. But I recall Panel 4 testimony to be
20 that, in general, CO(2) and other environmental
21 emissions would probably be reduced as a result of fuel
22 switching because of the high efficiency of use at the
23 homes and at the generating station.

24 Q. Dr. Effer, if you could look at page
25 31 of my exhibit.

1 THE CHAIRMAN: Are you going on to
2 something else?

3 MR. WATSON: Yes. Perhaps this would be
4 a good time for the break, Mr. Chairman.

5 THE CHAIRMAN: All right.

6 THE REGISTRAR: This hearing will take 15
7 minutes recess.

8 ---Recess at 11:30 a.m.

9 ---On resuming at 11:45 a.m.

10 THE REGISTRAR: Please come to order.
11 This hearing is again in session. Please be seated.

12 MR. WATSON: Q. Dr. Effer, we are just
13 looking at page 31 of Exhibit 479. As you can see,
14 that is a table showing fossil generation, NUG
15 generation, and the primary load forecast in
16 terawatthours. This information was derived from the
17 Hydro exhibit titled Data for Figures of Exhibit 452,
18 in particular the data at pages 4 and 11.

19 Subject to your checking these figures, I
20 assume you have no difficulty with them?

21 DR. EFFER: A. No.

22 Q. What I have done, and you probably
23 know this because you have had this for a while, but
24 for others who are just looking at this for the first
25 time, what I have done is compiled the figures here and

1 I am going to use them in the following table to get an
2 estimate of CO(2) emissions.

3 Before we do that, though, do you have
4 any idea of what proportion of NUG generation is going
5 to contribute to CO(2) emissions?

6 Perhaps this question is more
7 appropriately addressed to Mr. Shalaby, Mr. Burpee or
8 Mr. Meehan.

9 The NUG industry is basically a gas
10 industry; isn't that correct?

11 MR. SHALABY: A. Yes.

12 Q. And as a gas industry it's going to
13 have CO(2) emissions?

14 A. It will.

15 Q. Now, if we could look at table 2, Dr.
16 Effer, that's a table entitled Estimated CO(2)
17 emissions, the units are teragrams, and the first
18 column again is the contribution from Hydro's fossil
19 program, and those figures are from Hydro's document
20 titled Data for Figures for Exhibit 452, page 23. You
21 can see all this at the bottom of the exhibit.

22 Column No. 2 is entitled NUGs, and as you
23 can see what we have done is made an assumption of 0.33
24 kilograms of CO(2) per kilowatthour of NUG generation.

25 My first question to you is, that struck

1 me as a reasonable, if not conservative, estimate,
2 would you agree with that?

3 You might get some assistance by looking
4 at page 6-8 of Exhibit 4, which is the environmental
5 analysis. That gives a graph of CO(2) produced by
6 power generation processes.

7 DR. EFFER: A. We accept your estimate.

8 THE CHAIRMAN: I am sorry, I didn't hear
9 the answer.

10 DR. EFFER: We will accept Mr. Watson's
11 estimate of the emissions of CO(2) from NUGs.

12 MR. WATSON: Q. Of course, using that
13 estimate, just so that those following in the
14 transcript could understand, we have taken the
15 contribution from NUGs in column 2 of table 1 under the
16 heading NUGs, multiplied it by the factor that we have
17 just agreed on, 0.33, and arrived at the second column
18 in table 2 under the heading NUGs.

19 Do you follow that, Dr. Effer?

20 DR. EFFER: A. Yes.

21 Q. And in column 3 we have simply added
22 the first two columns together to get the total CO(2)
23 emissions in teragrams. Again subject to your getting
24 your calculator out and adding those figures up for
25 yourself, could we proceed on the basis that you will

1 accept them subject to check?

2 A. Yes.

3 Q. Now, is it fair to say then just
4 looking at these figures that NUGs will make a
5 significant contribution to CO(2) emissions?

6 A. That is correct.

7 Q. I guess my further question is, if
8 they are going to make this contribution, shouldn't
9 they be taken into account in looking at the overall
10 generation of electricity in this province?

11 A. That is an assumption that has to be
12 made by others than Ontario Hydro.

13 Q. Is that your way of referring me to
14 the Planning Panel, Dr. Effer?

15 MR. SHALABY: A. The Ontario government
16 tabled papers here in this hearing about carbon dioxide
17 control strategies and ways of achieving reductions in
18 carbon dioxide emissions.

19 So I think what Dr. Effer is saying, it
20 is a provincial policy issue rather than just an
21 electricity generation issue.

22 Q. Yes. Now, if we could turn to page
23 34 of my exhibit. What we have done is attempted to
24 graph the results of table 2. In looking at that,
25 looking at either table 2 or the graph, whichever you

1 prefer, Dr. Effer, I guess we can note the following:
2 First of all, CO(2) emissions are below the 25 teragram
3 target in this decade, and indeed they are below the 20
4 teragram target at the turn of the century.

5 DR. EFFER: A. Correct.

6 Q. And perhaps just so there is no
7 confusion, this graph has two lines on it, the bottom
8 line is just the Hydro fossil contribution, the line
9 above that is Hydro fossil contribution plus the NUG
10 contribution that we have calculated in table 2. You
11 have no difficulty with that?

12 A. No.

13 Q, And then as we get out into the year
14 2010, you will notice a line, both lines go up but
15 there is a dotted line that projects at a slope which
16 is considerably less than the solid line, and the
17 difference between those two lines, the divergence, if
18 you will, is a function of whether you use a major
19 supply option fossil plant or whether you use a nuclear
20 plant; you have no difficulty with that?

21 A. No.

22 Q. So just looking at this graph as you
23 get into the next decade through 2000 to 2005 we see
24 both graphs increasing. Certainly with respect to the
25 Hydro program by itself, just before the year 2005 you

1 are above the 20 teragram mark, and when you include
2 NUGs you are above the 25 teragram limit?

3 A. That's correct.

4 Q. When we get into the year 2010, you
5 are almost up to 30 when you include NUGs, and you are
6 below the limit when you don't include the NUGs. And
7 then you notice how after 2010 the plan changes
8 dramatically. If your major supply option is fossil,
9 then there is absolutely no hope of being anywhere near
10 the limits; is that fair?

11 A. That is correct.

12 Q. Okay. Dr. Effer, if we could turn to
13 page 33 of my exhibit. That's entitled Table 3,
14 Response Portfolio, and as you can see, there are five
15 items there and they are taken from the response
16 portfolio listed at page 28 of the Demand/Supply Plan
17 update. I would just like to briefly look at each one
18 of those.

19 Installation of CTUs is the first, and
20 there is no doubt that that is going to contribute to
21 CO(2) emissions; is that fair?

22 A. In themselves, yes.

23 Q. We were just looking at figure 6.6
24 with respect to the CO(2) produced by power generation
25 processes. The combined-cycle process is around .4;

1 the conventional boilers such as, for instance, say,
2 wood waste is over 1, most of the coal is around 1.

3 THE CHAIRMAN: Sorry, what are you
4 looking at, Mr. Watson?

5 MR. WATSON: I am looking at figure 6.6
6 of Exhibit 4, Mr. Chairman, the environmental analysis.

7 THE CHAIRMAN: Thank you.

8 MR. WATSON: Q. Just going down the
9 list, Dr. Effer, you notice that the fifth item is
10 natural gas and that's at .5.

11 DR. EFFER: A. Right.

12 Q. And that's for, if you look at the
13 colour graph, or the colour marks on the side, that
14 indicates natural gas for a conventional boiler.

15 If you go further down you notice natural
16 gas again under combined cycle and that's about 0.4;
17 for cogeneration, two below that, it's about 0.3, and
18 near the bottom, third up from the bottom, natural gas
19 again for large CTUs is about 0.6.

20 So there appears to be quite a range for
21 natural gas which would be used to fuel CTUs. But if
22 in fact the figure of 0.6 is used, then the
23 contributions that we were looking at before are going
24 to be a little larger; isn't that fair?

25 We were using an estimate before of 0.33.

1 MR. SHALABY: A. If you assume
2 replacement of NUGs by simple CTUs?

3 Q. Yes.

4 A. Then the CTU emissions would be
5 larger.

6 Q. That takes us into the next issue
7 which is increased NUGs. If in fact you have further
8 NUGs, NUGs as Mr. Shalaby has told us are primarily gas
9 burners, that's going to have a CO(2) effect as well,
10 won't it?

11 DR. EFFER: A. Correct.

12 MR. SHALABY: A. As you just told us,
13 their CO(2) emissions are lower than other conventional
14 generation. High efficiency cogeneration produces less
15 CO(2) than conventional generation.

16 Q. Certainly we have to look at the mix,
17 Mr. Shalaby, and if there are any studies with respect
18 to the mix you have indicated you are going to produce
19 them. But right now we have no studies; is the
20 situation?

21 A. Most NUGs are cogeneration
22 facilities, that much we know.

23 Q. That's the current situation?

24 A. Yes.

25 Q. And certainly we heard in Panel 5

1 that there are a lot of proposals for what were called
2 major supply NUGs, and we have heard evidence that
3 there is a 350 megawatt major supply NUG; is that fair?

4 A. Yes.

5 Q. And the next item is increased DSM,
6 and again, depending on what supply of Hydro is
7 displaced, there may or may not be some CO(2) issues
8 based on fuel switching; is that fair?

9 DR. EFFER: A. That's correct.

10 Q. Fourth one is demothballing. Of
11 course, demothballing, if it involves coal plants, it's
12 going to again have a CO(2) component to it; is that
13 fair?

14 A. Correct.

15 Q. Last one is major supply. First of
16 all, if major supply is coal or natural gas, that's
17 going to contribute to CO(2)?

18 A. Correct.

19 Q. If we could just take that one step
20 further. It looks as though you have an option between
21 a fossil major supply and a nuclear major supply. And
22 in looking at Exhibit 452 there is a concern about lead
23 times, that 452 is going to encompass shorter lead
24 times.

25 If in fact that is true, then nuclear

1 plants have a longer lead time than fossil plants, so
2 in effect aren't we more realistically talking about
3 major supply being fossil and therefore the CO(2) issue
4 being even more significant?

5 MRS. FORMUSA: Mr. Chairman, I would
6 suggest that that question can go to Panel 10. It's a
7 choice amongst options. On this panel we can talk
8 about the lead times for fossil options, on Panel 9 we
9 will talk about the lead times associated with the
10 various nuclear options.

11 Response Portfolio is really something
12 being addressed in terms of the choices on Panel 10.

13 MR. WATSON: Mr. Chairman, I will
14 rephrase the question.

15 Q. Just looking at the graph, Dr. Effer,
16 if in fact the major supply option is fossil, you are
17 going to get the upper end of the CO(2) emissions which
18 are shown on the graph on page 34?

19 DR. EFFER: A. That's correct.

20 Q. Returning to table 1, Dr. Effer, you
21 will notice we indicated what we would experience not
22 only with the median load but with the upper load. And
23 the last column is the difference between those two.
24 Again, subject to check, we will proceed with those
25 numbers.

1 Again, if you look at table 2, we have
2 done exactly the same thing, and we have the increased
3 CO(2) emissions if the upper load growth is met through
4 fossil generation.

5 So there is no confusion to those reading
6 the transcript, the assumption that we have made there
7 is the 0.5 kilograms of CO(2) per kilowatthour, which
8 would be based on the figures that we were referring to
9 in figure 6.6 of Exhibit 4. That gives us, on the
10 final column, our totals using the upper load growth if
11 the growth is met through the fossil program.

12 I guess the simple question is, Dr.
13 Effer, if in fact we do have upper load growth, then
14 Hydro is not going to meet that 25 teragram limit by
15 the year 2005, let alone the year 2010.

16 A. That is correct.

17 Q. Dr. Effer, and maybe Mr. Shalaby,
18 looking at some of the risks associated with this, if
19 the Manitoba Purchase should fall through for whatever
20 reason, the consequence of that is also going to also
21 be higher CO(2) emissions isn't; that fair?

22 MR. SHALABY: A. I think the real risk
23 here is that my counsel would object to my comparing
24 options to one another.

25 Yes, if you take an option away that is

1 not CO(2) emitting and you put another option in in its
2 place that is CO(2) emitting, then you increase the
3 CO(2) emissions.

4 Q. It's the same situation, for
5 instance, if the nuclear capability factors are
6 reduced?

7 A. If the replacement is fossil
8 generation the answer is yes.

9 Q. Are there any other risks that you
10 can think of, Mr. Shalaby?

11 A. To what? To increasing CO(2)
12 emissions?

13 Q. Yes. I have mentioned two.

14 A. I think between increased demand and
15 reduction in non-emitting options, that gathers a large
16 range of options right there.

17 Q. Okay. Dr. Effer, if you could look
18 at Exhibit 40, that's the task force on greenhouse
19 effect, that's an Ontario Hydro document report, 678SP.

20 DR. EFFER: A. I have it here.

21 Q. Turning to the conclusion, Dr. Effer,
22 it starts on page 21 and goes over to page 22. I don't
23 propose to go through it with you in any detail.
24 Certainly if there are points you want to make outside
25 of what I raise, feel free.

1 [12:12 p.m.]

2 On page 22, the second bullet --

3 DR. EFFER: A. Excuse me, Mr. Watson, I
4 have a copy here which doesn't coincide with your
5 numbers.

6 Q. Okay. I have report 678SP, dated
7 November 1989. What is the date of your report, Dr.
8 Effer?

9 A. Same date. I am on page 21 now.

10 Q. That is where the conclusion starts.
11 Over to 22, the second bullet, just talking about the
12 risks, we are talking about regulatory changes.

13 And would you agree with me that a risk
14 is that an abrupt change in regulation could result in
15 a shift to more electricity use?

16 A. What kind of a regulation are you
17 referring to, Mr. Watson? A regulation applied how?

18 Q. I am reading the bullet on page 22
19 where it says regulatory changes need to be phased to
20 permit infrastructure to change. I assume what they
21 are talking about is environmental regulations. That's
22 my understanding of this. Isn't that fair, Dr. Effer?

23 The conclusion is, if in fact there is a
24 rapid change in regulation, that could result in a
25 shift in energy use to electricity. That's a risk that

1 we could have higher CO(2) emissions than forecast;
2 isn't that correct?

3 A. On the assumption that regulation
4 applied to Ontario Hydro, yes.

5 Q. Just following up on that. The
6 fourth bullet is a more global concern and indicates
7 that if those regulations were applied across the board
8 to all sectors of the economy, there would likely lead
9 to an increase in electricity demand and again have a
10 CO(2) impact.

11 A. That is correct as scenario two in
12 that reports indicates.

13 Q. Dr. Effer, we have been talking about
14 CO(2). My understanding is that there are other
15 greenhouse gases as well; is that fair?

16 A. That is correct.

17 Q. In your analysis of fossil generation
18 and emissions, have you given any consideration to
19 these other greenhouse gases?

20 A. We consider that from Ontario Hydro's
21 generation, by far the majority of the greenhouse gas
22 production is from CO(2) emissions.

23 Q. Do you agree, Dr. Effer, that a
24 natural gas is a potent greenhouse gas.

25 A. The methane in natural gas, yes.

1 Q. Would you also agree that there is a
2 risk of gas leakage or loss during a transmission of
3 gas to where it's required?

4 A. Yes.

5 Q. In fact on page 19 of Exhibit 468,
6 doesn't Hydro refer to that as a 2 per cent figure?

7 A. Correct.

8 Q. Also nitrous oxide, that's $N(2)O$, is
9 a product of combustion; isn't that fair?

10 A. Yes, it is a product of combustion.

11 Q. Is that a significant greenhouse gas?

12 A. Yes.

13 MR. WATSON: Could I have a moment, Mr.
14 Chairman.

15 ---Off the record discussion.

16 MR. WATSON: Q. Dr. Effer, just so I am
17 not confused. Nitrous oxide, you have indicated, is a
18 significant greenhouse gas. Do you mean by that it is
19 a significant by-product of fossil fuel combustion?

20 DR. EFFER: A. No.

21 Q. Can you tell us what the basis of
22 your conclusion is?

23 A. Some relatively recent analyses have
24 shown that the previous levels of nitrogen oxide in
25 stack gases were, in actual fact, an artifact of the

1 experimental method used and that the latest figures
2 for actual levels of nitrogen oxides have been very
3 drastically revised downwards. And we now consider
4 that it is an extremely small component of the overall
5 greenhouse gas volume potential from stack gases.

6 Q. Are you referring to EPRI
7 documentation?

8 A. Excuse me. You did say in that
9 question nitrogen oxide. You meant nitrous oxide.

10 Q. Yes?

11 A. Okay. My answer stands.

12 MR. WATSON: Thank you.

13 Mr. Chairman, those are my questions with
14 one caveat. The MEA is quite concerned about the
15 amount of information that was I guess not produced
16 with respect to Exhibit 452. We have done the best we
17 could with the information that has been produced. We
18 have asked for much more information. I think as you
19 saw during the cross-examination, there are other areas
20 where information is required, certainly information in
21 this area.

22 Subject to getting that information and
23 reviewing it and trying to resolve things outside of
24 the hearing, we may have to come back and ask your
25 indulgence to pursue certain matters further. Thank

1 you.

2 THE CHAIRMAN: Okay, Mr. Watson.

3 DR. CONNELL: Panel, just a few moments
4 ago, Mr. Watson referred to Exhibit 468, page 19. The
5 reference to 2 per cent of gas lost. Just in reading
6 that paragraph, there seems to me to be some ambiguity.
7 Do you understand that to be 2 per cent of gas lost
8 from source to end use or 2 per cent in Ontario?

9 DR. EFFER: That percentage lost is on
10 the whole transmission of the gas. During transmission
11 of the gas up to the point of use.

12 DR. CONNELL: Thank you.

13 THE CHAIRMAN: Thank you, Mr. Watson.

14 MR. WATSON: Thank you, Mr. Chairman.

15 THE CHAIRMAN: Mr. Rodger.

16 MR. RODGER: Thank you, Mr. Chairman.

17 I have one package of materials that I am
18 going to be referring to in my cross-examination. If I
19 could have that marked as the next exhibit, please.

20 THE CHAIRMAN: Yes.

21 THE REGISTRAR: The number is 480, Mr.
22 Chairman.

23 ---EXHIBIT NO. 480: Materials referred to by AMPCO in
24 cross-examination of Panel 8.

25 MR. RODGER: I have extra copies at the

1 front for my friends.

2 CROSS-EXAMINATION BY MR. RODGER:

3 Q. Panel, Mr. Watson covered the life
4 extension issues and I don't intend to cover that
5 ground again. But I want to see if I understand your
6 evidence with respect to that issue and see if I can
7 make a broad conclusion and whether you will agree with
8 me.

9 With respect to the life extension issue,
10 would it be fair to conclude that the evidence that
11 Panel 2 gave in connection with that issue, that that
12 testimony in connection with the life extension issue,
13 that testimony can now be disregarded by this Board in
14 light of the new corporate position?

15 MR. MEEHAN: A. I am not familiar with
16 all of that testimony, but certainly the testimony that
17 would refer to the extension of life from beyond 40
18 years for Nanticoke and Lambton can be disregarded.

19 Q. Thank you.

20 THE CHAIRMAN: Well, just to be
21 technical. It is still evidence and I suppose we have
22 to weigh it. It is their view that it should be
23 disregarded.

24 MR. RODGER: Q: Dr. Effer, if I could
25 turn to you for a moment. And again this issue was

1 gone over, but I have a couple of additional points.

2 You talked about the conference in
3 Toronto on changing atmosphere, and the 1988 target of
4 20 per cent reduction. In 1990 that target was changed
5 to reflect stabilizing national emissions of CO(2) at
6 1990 levels by the year 2000.

7 Could I ask you: Who suggested that
8 change in 1990? Was that something that Ontario Hydro
9 put in place on its own regard or, for example, was it
10 the target that was suggested by the Government of
11 Ontario?

12 DR. EFFER: A. I understand that the
13 European community reached an agreement to stabilize
14 its CO(2) emissions by the year 2000 and Canada adopted
15 that same target.

16 Q. Do I understand it correctly that the
17 actual levels of Hydro's CO(2) emissions in 1990, was
18 in fact 25 teragrams?

19 A. Yes.

20 Q. If I could refer you to page 1 of
21 AMPCO Exhibit 480, and you will recognize this as being
22 taken from Hydro Exhibit 452, Figure C5 shows CO(2)
23 emissions. You have discussed with Mr. Watson how
24 under this scenario the 25 teragram target could not be
25 achieved after the year 2010.

1 I guess my general question is: What is
2 Hydro then doing in order to achieve the limits that
3 are being set down and that Hydro anticipates? Or is
4 Hydro proceeding on rather the broader conclusion that
5 no matter what it does, it just is not going to meet
6 the CO(2) targets?

7 A. In the Demand/Supply Plan Update, we
8 have outlined the various methods which we can adopt,
9 and are adopting, which will result in much reduced
10 fossil component, and that is one of the major
11 contributors to the lower CO(2) outputs on a
12 system-wide basis, coupled with energy
13 conservation. These are the main examples of how we
14 are maintaining below that level.

15 Our Update does indeed show that by 2010
16 we cannot achieve that 25 gigagrams limit, having done
17 all those, made these changes in the update.

18 Q. So that is your conclusion then: As
19 far as Hydro is concerned, you just can't meet the
20 targets that are being proposed?

21 A. As the update says, the level cannot
22 be achieved.

23 MR. SHALABY: A. Figure C5 shows a
24 target to be achieved depending on the expansion option
25 in the year 2010. So you are quite right, the target

1 cannot be achieved if additional fossil generation is
2 added, but it shows that if nuclear generation is
3 added, the target can be achieved.

4 Q. Am I correct that even with the
5 nuclear option, you are going to exceed the limit from
6 approximately 2010 to 2012?

7 A. Temporary exceedance, yes.

8 THE CHAIRMAN: Just as an aside comment.
9 I suppose at some point we will get evidence as a
10 distinction between the updated plan and the enhance
11 plan?

12 MR. SHALABY: Yes.

13 THE CHAIRMAN: Will that be Panel 10? We
14 haven't heard about that enhanced plan before.

15 MR. SHALABY: Panel 10 will certainly
16 expand on that, yes.

17 MR. RODGER: Mr. Chairman, you have
18 anticipated my next question. Let's see how far we
19 get.

20 Q. With respect to the enhanced line on
21 figure C5, what measures were assumed by Ontario Hydro
22 which resulted in that enhanced line on graph C5? What
23 measures were you putting in place to achieve those
24 lower levels of CO(2) emissions?

25 DR. EFFER: A. You are referring to the

1 lower of those two lines?

2 Q. Yes, the emission line that has the
3 label "enhanced" in figure C5.

4 A. Some of those details are supplied in
5 the demand/supply update and they involve bringing
6 forward in time many of the controls, the scrubbers,
7 increasing the number of units further, of scrubber
8 units, and bringing forward the in-service dates for
9 example.

10 Q. Was there one predominant measure in
11 the enhancement scenarios that is more important than
12 the others or is there a series of equally weighted
13 enhancement measures?

14 A. The predominant one is increasing the
15 number of installed units of scrubbers.

16 Oh, I have to backtrack on that one. I'm
17 talking about SO(2), aren't I?

18 Q. Yes.

19 A. As far as CO(2) is concerned rather
20 than -- obviously that installation would not result in
21 a decrease in CO(2).

22 Q. I'm sorry, Dr. Effer, I am having a
23 little trouble hearing you. Can you bring your
24 microphone a little closer, please.

25 A. My previous answer was based

1 incorrectly on my belief that I was talking about
2 sulphur dioxide and of course carbon dioxide emissions
3 would not be affected by increasing the number of
4 scrubbed units.

5 The measures that would result in lowered
6 CO(2) emissions are, I think I have some information...
7 Yes, the predominant factor would be increased
8 conservation measures and conversion to gas, which is a
9 lower CO(2) emitting fuel.

10 Q. Now you have testified a number of
11 times, Dr. Effer, regarding Hydro's policy of trying to
12 anticipate future environmental regulations as they
13 pertain to Ontario Hydro and how the general thrust of
14 your thoughts in this area is that the regulations are
15 going to be tighter and tighter as time goes on.

16 If you could turn to page 2 of Exhibit
17 480, and this is taken from Ontario Hydro Exhibit 40,
18 page 17, the task force on the greenhouse effect. And
19 in that report you present a number of scenarios with
20 respect to CO(2) limits.

21 [12:30 p.m.]

22 At 4.3, scenario 3, you present the
23 scenario that all sectors of the provincial economy are
24 required to reduce CO(2) emissions to 50 per cent of
25 1988 levels by 2020.

1 My question for you, Dr. Effer, is, in
2 the year 2000 would you tell me which would be the more
3 stringent target for Ontario Hydro to meet, the 1990
4 cap as we have discussed previously, or this scenario
5 3, and that's for the year 2000?

6 A. I wouldn't be able to be certain. It
7 would depend very much on the transfer of load to Hydro
8 and also the actual effects of global warming. I can't
9 say definitely there.

10 Q. If you would assume with me that
11 scenario 3 is the more stringent target by the year
12 2000, what could Hydro do to attempt to meet that
13 target within the next eight years in addition to what
14 it's doing already.

15 A. The only practical measure that can
16 be taken would be to repower some of the existing
17 fossil units, and that would involve also installing
18 combined cycle. That would reduce the overall CO(2)
19 levels on an energy basis.

20 Q. When you say repowering the units,
21 does that mean converting existing stations that use
22 either coal or oil, convert those to be natural gas
23 burners?

24 MR. DAWSON: A. Well, converting to
25 natural gas is part of it, but you would also acid gas

1 turbines, reheat boilers to power the existing steam
2 turbines, so you increase the overall cycle efficiency
3 as well.

4 Q. Am I correct when I say that burning
5 natural gas produces about half the CO(2) of burning
6 oil or coal?

7 A. No. Burning natural gas would reduce
8 the CO(2) emissions by, I think it is around 20 per
9 cent. You would get about a 50 per cent reduction by
10 the repowering process and increasing the cycle
11 efficiency as well. By doing that you cut the CO(2)
12 emissions to about half.

13 Q. Now, in this panel, as well as
14 earlier panels, you have described how Hydro has at
15 least contemplated converting the Lennox station to be
16 a natural gas burning station. To what extent has
17 Hydro considered this conversion for its other fossil
18 stations?

19 MR. MEEHAN: A. The Lennox idea is the
20 one that seems most promising and it is the one that I
21 am most familiar with. I think that Hydro has
22 undertaken consultant studies that go beyond Lennox,
23 but I am personally not that familiar with them.

24 Q. Can you provide any commentary with
25 respect to the Keith facility?

1 A. Keith.

2 Q. Yes?

3 A. I can't. Perhaps Mr. Dawson can.

4 MR. DAWSON: A. I think there are some
5 consultant studies going on right now to look at the
6 potential conversion of a number of our stations such
7 as Keith, Hearn and Lakeview, I think, but they are
8 purely paper studies and they are just being developed
9 for information purposes. We haven't got any plans
10 that go beyond there that at this point.

11 Q. Do you have any idea when those
12 studies will be completed?

13 A. I think they are in a draft form
14 right now. They are very close to completion. I would
15 expect in another month or so that they would be
16 completed.

17 Q. Would you be able to provide me with
18 copies of those studies when they are completed?

19 A. I believe so, yes.

20 MR. RODGER: Could I have the next
21 undertaking number, please

22 THE REGISTRAR: 478.11.

23 ---UNDERTAKING NO. 478.11: Ontario Hydro undertakes to
24 provide consultant studies re the
25 potential conversion of a number of
stations such as Keith and Lakeview.

1 MR. RODGER: Q. Just one further
2 question to that point, Mr. Dawson.

3 Do you know if these studies are
4 contemplating making these fossil units dual fired,
5 that it is being capable of burning oil and gas or coal
6 and gas?

7 MR. DAWSON: A. No, I think the focus
8 has been more on repowering and going to combined-cycle
9 generation using the existing steam turbine facilities.
10 I am not totally sure, to be honest, whether in fact we
11 have also looked at straight gas firing, I couldn't
12 tell you without checking.

13 Q. Could you give me any kind of a
14 ballpark figure as to how long Hydro would estimate
15 that it would take for the conversions to be complete,
16 for example, the Lennox station?

17 A. The actual conversion time I would
18 think would be something of the order of a couple of
19 years.

20 Q. Would you anticipate that Hydro would
21 have to go through an environmental assessment process
22 before such a conversion could take place?

23 MRS. FORMUSA: I think whenever we
24 undertake work, we consider all the environmental
25 regulations that we have to meet and those decisions

1 would be taken at that time.

2 MR. RODGER: Q. So, it certainly could
3 be a possibility then that an environmental assessment
4 may be required?

5 MR. DAWSON: A. Yes.

6 Q. Could I ask you, panel, to turn to
7 page 3 of Exhibit 480. I have taken this page from
8 Exhibit 6, an Ontario Hydro exhibit, page 7-12, and I
9 am interested in figure 7.5-1, Illustrative Marginal
10 Costs for Acid Gas Control Options. I would really
11 like to ask a question of clarification.

12 The figure identifies marginal costs of
13 various options for reducing acid gas emissions at
14 Lambton and Nanticoke. First of all, could you tell me
15 what you mean by marginal costs here. Does it mean,
16 for example, the costs of removing the first unit of
17 acid gas or does it mean the cost for the entire
18 program?

19 MR. SHALABY: A. Removing the last unit,
20 actually.

21 Q. Removing the last unit. Maybe you
22 could just explain that please, Mr. Shalaby?

23 A. If you want to reduce emissions by
24 another megagram, as those units are in, what would it
25 cost to you reduce emissions yet another megagram.

1 Q. Thank you. Staying with this figure
2 7.5-1, the last two options involve natural gas. I am
3 wondering if you could tell me, Mr. Smith, which
4 natural gas forecast was used in preparing this figure?

5 MR. SMITH: A. I really can't tell you
6 because I wasn't involved or haven't seen the work that
7 went into preparing this.

8 I assume if you can find a date, we only
9 have a page here, but if you find a date on your
10 exhibit then it would probably give some indication.

11 MR. SHALABY: A. In most likelihood it's
12 the general gas that Mr. Smith showed in one of the
13 slides that he showed. He showed the forecast in gas
14 prices at the time of the DSP and it showed a category
15 of gas called general. In all likelihood that is the
16 gas price used for this.

17 Q. Perhaps I could ask you, Mr. Smith,
18 given your testimony about recent changes in the
19 forecast, could I take it that the revised natural gas
20 forecast wouldn't impact materially on the costs that
21 are shown in this figure?

22 MR. SMITH: A. I think that's right.

23 Q. Mr. Smith, staying with you, I wonder
24 if you could turn to page 9, please, of Exhibit 480.
25 This is taken from the DSP update, Exhibit 452, page

1 19. I am looking at figure 8-4, which is projections
2 of future gas prices. I just want to confirm firstly
3 that the projections in that figure, those are all
4 based on firm supply; is that correct?

5 A. Those are commodity prices in
6 Alberta, not delivered prices. But I think they would
7 be a firm price for the commodity in Alberta, yes.

8 Q. Going back to my questions to Mr.
9 Dawson. If Hydro were to make the decision to convert
10 some of its fossil plants to dual fuel, burning coal
11 and gas or oil and gas, would it then not be possible
12 for Ontario Hydro to take advantage of interruptible
13 natural gas rates?

14 A. Yes.

15 Q. Interruptible rates are cheaper than
16 the firm rates?

17 A. Yes, that's true.

18 MR. RODGER: If I you could give me a
19 minute, Mr. Chairman, Mr. Watson may have covered some
20 ground here, so I might be able to skip ahead.

21 If you could turn now to page 4 of
22 Exhibit 480, and this is Interrogatory 8.24.2.

23 THE REGISTRAR: Which is .15.

24 ---EXHIBIT NO. 475.15: Interrogatory No. 8.24.2.

25 MR. RODGER: Q. In this interrogatory

1 AMPCO was asking you about what Hydro intended to do
2 with certain solid waste produced at some of your
3 fossil facilities. The first part of the question
4 asked whether Hydro has conducted any market studies
5 for gypsum and the feasibility of entering into this
6 market. If you go over to page 5 we see Hydro's
7 response, that in fact it has conducted market analysis
8 and was negotiating the sale of gypsum to wallboard
9 producers. The answer goes on to state that:

10 The market for gypsum from Ontario
11 Hydro's generating stations is
12 concentrated in Ontario and around the
13 Great Lakes, and each year approximately
14 about 2 million tonnes of gypsum is used
15 for wallboard manufacture in this region.

16 Ontario Hydro is building scrubbers
17 on two units of four at Lambton thermal
18 generating station. These will produce
19 approximately 250,000 tonnes of gypsum a
20 year. Possible future scrubbers could
21 add up to 750,000 tonnes a year.

22 Now, if you could go to page 8, keeping
23 that answer in mind, this is taken from Exhibit 452,
24 and figure C2 is entitled Environmental Enhancements
25 Considered in DSP Updates, and to the far left of that

1 chart you see the first part of that graph deals with
2 SOx, flue gas desulphurization. We see that in the DSP
3 Update, the number of units for SOx is increased to
4 about 12.

5 Can you tell me, given the answer in the
6 interrogatory as to the amount of tonnage of gypsum
7 that is produced with two scrubbers, how much gypsum
8 will be produced as a result of the ten scrubbers that
9 are indicated in this figure?

10 MR. DAWSON: A. I don't think I could
11 answer that directly because it's a question of the
12 energy produced from those units, the energy produced
13 from the units that have scrubbers on them. And simply
14 because you more than double the amount of the
15 scrubbers doesn't mean that the amount of energy that
16 you scrubbed is going to be more than double as well;
17 in fact, it won't be.

18 Q. In your answer to that interrogatory
19 you estimated 750,000 tonnes, would that be reasonable
20 to reply to the 12 units?

21 A. I would suspect it would be more than
22 750,000 tonnes from the 12 units. The fact that we
23 have got 12 units, it's not going to be three times the
24 amount of gypsum. It probably won't be double. It
25 will be 1-1/2 times, something like that.

1 Q. Okay. Now, in the interrogatory
2 answer that I read, you stated that when you did your
3 market analysis that you decided that your market for
4 gypsum is Ontario and around the Great Lakes. Around
5 the Great Lakes, I took that to mean that your
6 potential market also includes the American states that
7 border on the Great Lakes; is that fair?

8 A. The it is our understanding that that
9 could be the case, yes.

10 Q. So in that case you would also be
11 competing with American utilities that sell to the
12 wallboard market?

13 A. We may be, yes. Though, I think it's
14 the wallboard market itself which would be into the
15 states rather than the gypsum by-product that would
16 have a market in the states. Again, it's not something
17 that you want to transport very far.

18 Q. Now, you describe that market as
19 being approximately 2 million tonnes of gypsum per
20 year. For your planning purposes how much of that
21 market is Ontario Hydro planning to capture?

22 A. I don't think it's something that we
23 have done an extensive market analysis on in the sense
24 that we have looked at how much of that total 2 million
25 tonnes that we believe we could capture.

1 What we do do is once we have settled on
2 installation of scrubbers at the station, we then go
3 out with proposals and find out what the market is for
4 gypsum, and we plan on the basis that we will sell
5 whatever we can and what we can't sell then will have
6 to be landfilled.

7 Q. So for your planning purposes, you
8 might be able to sell all of your gypsum for all you
9 know or you may have extensive tonnage that you have to
10 dispose of yourself?

11 A. In a sense we started off with the
12 worst case first in that we put scrubbers on at Lambton
13 and that's the greatest distance from the existing
14 wallboard plants.

15 In fact, we do now have a letter of
16 intent with a wallboard company to sell gypsum from
17 Lambton. So I think if we can sell it from Lambton,
18 it's a reasonable expectation that we can also sell at
19 least part of the production from Nanticoke, too.

20 Q. How many tonnes of gypsum does that
21 contract envisage?

22 A. It's my understanding, and I am not
23 totally familiar with the contract, I haven't seen the
24 contract, but it's my understanding it's the entire
25 production from Lambton that meets the wallboard

1 specification, and we would expect that to be all of
2 it.

3 Q. How many tonnes are we talking about?

4 A. Again it will depend on the actual
5 production. But I think if we go back to that
6 statement on page 5, it will be the quarter of a
7 million tonnes that was referred to from the first two
8 units at Lambton.

9 THE CHAIRMAN: This is all very
10 interesting but what has it to do with what we have to
11 decide?

12 MR. RODGER: Hopefully I will come to
13 that, Mr. Chairman.

14 Q. Moving on to page 7 of Exhibit 480,
15 we asked you about storage of these wastes, and in
16 answer 4A you state that 75 per cent of the flyash is
17 stored at Hydro's thermal generating station sites, 25
18 per cent is recycled or used in the cement industry.

19 The answer to question five is that the
20 Lakeview generating station does not have landfill
21 space. The other stations have landfill space or the
22 approvals necessary to acquire and develop the
23 necessary space.

24 Could you tell me what approvals Ontario
25 Hydro has to obtain and which approvals they have

1 obtained in connection with disposing of the waste
2 described in these answers?

3 MR. DAWSON: A. In order to dispose of
4 waste we do have to get an environmental assessment
5 approval and following that we would have to get
6 various approvals under the Environmental Protection
7 Act.

8 We have carried identity a program
9 environmental assessment for scrubbers for both Lambton
10 and Nanticoke, and Lakeview for that matter, if we ever
11 decide that we need to install scrubbers at Lakeview,
12 and we therefore do have the environmental assessment
13 approval to acquire additional land for waste disposal
14 for both flyash and FGD waste is my understanding,
15 because one option is that you would mix the two
16 together in order to stabilize the waste prior to
17 landfilling.

18 Q. So those approvals are in place as we
19 speak.

20 A. Yes.

21 Q. When does Hydro anticipate requiring
22 off-site disposal areas?

23 [12:50 p.m.]

24 A. At Lambton I don't think we do
25 anticipate requiring off-site disposal areas because,

1 as I say, it looks very much as though we are going to
2 have a contract to sell the gypsum waste.

3 At Nanticoke it will depend on the
4 production rate of gypsum, but I believe sometime after
5 about the year 2000 we may need some additional space.

6 Q. This ties in with my purpose of this
7 question, Mr. Chairman.

8 With Hydro's policy of anticipating new
9 types of environmental regulation that might be coming
10 down the road in the next few years, does Hydro
11 anticipate that the disposal of these types of wastes
12 might also come under more strict environmental
13 controls where you might have to be looking at other
14 solutions to dispose of this waste.

15 A. I think we already are looking at
16 other solutions to disposal. In fact, I think we have
17 recognized that disposal costs are increasing and it is
18 going to become more difficult to dispose of wastes;
19 and as a result of that, the potential for reuse and
20 recycle of ash and FGD waste is increasing, and we
21 think there is more potential to recycle ash.

22 I think we see that as a solution to
23 disposal problems in the future: is to recycle more
24 into the cement industry. In fact, we are looking at
25 some options to do that and also to use it as an

1 aggregate. Those sorts of options are being explored
2 now.

3 Q. Of course I take it that there would
4 be a certain cost associated with doing that extra
5 processing or recycling?

6 A. Yes, that's right. It increases the
7 disposal cost over what have been historically our
8 disposal costs, but at certainly at lot lower cost than
9 looking at off-site disposal, which is the alternative
10 for Lakeview at least.

11 MR. RODGER: Mr. Chairman, it is five to
12 one. I wonder if I can have the lunch hour to maybe
13 review my notes. I think I can cut my
14 cross-examination down further given Mr. Watson's
15 questions.

16 THE CHAIRMAN: Thank you, Mr. Rodger
17 We will adjourn now until two-thirty.

18 THE REGISTRAR: This hearing will adjourn
19 until two-thirty.

20 ---Recess at 12:55 p.m.

21 ---On resuming at 2:34 p.m.

22 THE REGISTRAR: This hearing is again in
23 session. Be seated, please.

24 THE CHAIRMAN: Mr. Rodger.

25 MR. RODGER: Thank you, Mr. Chairman.

1 Q. Panel, before we broke for lunch, we
2 were speaking about solid waste from fossil-fired
3 plants. Just to wrap up that line of questioning, I
4 want to see if you will agree with me if I give you the
5 following description of the issue and the concern as
6 my client perceives it.

7 We know that as a result of increased
8 number of scrubbers at Hydro fossil facilities, there
9 is going to be an increased amount of solid waste, and
10 that the amounts of solid waste that we are talking
11 about is considerable, hundreds of thousands of tonnes
12 per year.

13 While Hydro has done market analysis as
14 to where it can sell some of this waste, to the gypsum
15 industry and also to the cement industry, it's
16 uncertain at this time just how much will be sold.
17 Hydro recognizes this and quite appropriately it has
18 sought and obtained approvals with respect to various
19 environmental assessments for off-site disposal.

20 However, the issue remains an open one
21 because depending on the amounts of waste and on new
22 and potentially tougher environmental regulations,
23 there may be further restrictions on Hydro in disposing
24 of this waste and that in turn would impact on the
25 costs of generating electricity by fossil-fired option.

1 Is that a fair characterization of the issue.

2 MR. DAWSON: A. I would say that I think
3 we have a reasonable level of confidence that we will
4 be able to market a lot of the gypsum that is produced.
5 As far as ash is concerned, then the ash production
6 isn't likely to change as a result of life extension.
7 So that I think any additional disposal space that is
8 required would be required regardless of the change in
9 the Demand/Supply Plan. So I don't think ash is an
10 issue. I don't think that will change. We are in
11 fact, I think, increasing our efforts to market ash,
12 but that would happen regardless.

13 In terms of gypsum, I would say that we
14 do have a reasonable level of confidence that we can
15 market the gypsum that we will produce. But you are
16 right, there isn't total confidence that we can do that
17 and as a result of that, we do need to have some space
18 for disposal. And we have already got environmental
19 assessment approval for that space.

20 Q. The idea of any future environmental
21 regulations with respect to gypsum, that again is
22 uncertain at this time?

23 A. Yes. Though I don't see gypsum as
24 being something that has got a lot of environmental
25 problems associated with it. We are washing it anyway

1 down to very high purity levels and gypsum itself isn't
2 toxic, so I don't think there are any major
3 environmental issues surrounding gypsum disposal.

4 DR. CONNELL: Just a thought. It might
5 be possible to ski on gypsum. I don't know if it has
6 ever been tried. But we could have a mountain of ash
7 with a liberal surface of gypsum on top of it.

8 MR. DAWSON: Well, that's true and there
9 are in fact existing stockpiles of gypsum. For
10 instance, down in the Lambton Area, CIL had a phosphor
11 gypsum plant down there and there is a pile that is
12 something of the order of 20, 30 metres high. But
13 that's hardly big enough to make much of a ski hill.

14 DR. CONNELL: A thousand metres would be
15 very respectable.

16 MR. RODGER: If the train still goes to
17 Collingwood, maybe we could consider that.

18 Q. If I could ask you to turn to page 9,
19 please, of Exhibit 480, and this is taken from Exhibit
20 452, the update, page 19. And there is a paragraph
21 entitled Alternative Energy Options. And the very last
22 sentence of that paragraph reads:

23 In particular, fuel cells are seen as
24 having potential to make a contribution
25 within the planning period.

1 I wonder if you can just confirm with me.
2 When you say the planning period, that refers to the
3 planning horizon out to 2014?

4 MR. SHALABY: A. Yes.

5 Q. And the last paragraph on that page,
6 states:

7 Therefore the 6,000 megawatts of major
8 supply options in the updated
9 Demand/Supply Plan while formally
10 assigned to nuclear and fossil options
11 for analysis purposes does not preclude a
12 contribution from alternate energy
13 options.

14 Are you able to tell me, Mr. Shalaby, how
15 many megawatts of alternate energy options is Hydro
16 assuming to fall within that 6,000 megawatt block that
17 will be required to be satisfied.

18 A. My understanding is that the 6,000
19 megawatts is just a gap to be filled by supply options
20 in the future. The exact nature and timing and sizing
21 of those supply options has not been determined.

22 All this is meant to say is there is an
23 opportunity for alternative energy options to
24 contribute to that supply gap that will start opening
25 up towards the end of the planning period.

1 Q. So in terms of a range of megawatts
2 from alternate energy sources at this point in time,
3 you just really don't have any idea? It could be 10
4 megawatts; presumably it could be 1,000 megawatts or
5 more?

6 A. As my testimony on alternative
7 energies, yes, it could be a wide range depending on
8 technology developments and many other things, yes.

9 Q. I have one question of clarification
10 regarding a Hydro overhead, and that is Exhibit 474.
11 It's the first slide. I didn't get a very good look at
12 it but I believe that the slide or the overhead in my
13 package is different to the one that was shown on the
14 screen. I just want to check that, please. It is
15 overhead Sl, Exhibit 474.

16 THE CHAIRMAN: It looks as if it is going
17 to take a minute or two. Is that your last question?

18 MR. RODGER: No, I can go on to something
19 else.

20 Q. Mr. Meehan, in your direct testimony,
21 you described different system uses for various fossil
22 options. And when you were discussing CTUs, they were
23 presented as options suitable as peaking units; is that
24 correct?

25 MR. MEEHAN: A. Yes, that's correct.

1 Q. I believe you testified that some of
2 the reasons for this is because of low capital costs
3 and shorter lead times when compared to other fossil
4 options?

5 A. And their technical characteristics.
6 Their quick start and that kind of thing makes them
7 suitable for that.

8 Q. Am I also correct that these features
9 of CTUs make the option attractive for Hydro in terms
10 of providing flexibility for your planning purposes?

11 A. Yes, they do that as well.

12 Q. As part of that flexibility, I
13 believe you testified or if not you in an earlier panel
14 with respect to CTUs that if there was for some reason
15 demand greater than anticipated, CTUs could be put in
16 place to fill any gap.

17 A. That's certainly one of the things
18 that we would look towards.

19 Q. I want to provide you with a
20 hypothetical and see whether you can agree with the
21 conclusions that I draw from that hypothetical.

22 You have a utility and the utility is
23 planning to meet future needs, and one of the key
24 planning principles of this utility is to have a least
25 cost system. And in its planning, it comes to the

1 conclusion that it won't be needing a major supply
2 option until a long time off in the future, that it's
3 not going to be needed for some years. And that in the
4 event that demand is higher than expected, then that
5 utility is going to put in CTUs to fill the gap.

6 As time goes on, the utility comes to
7 realize for a number of reasons, that aren't really
8 relevant to this hypothetical, but for a number of
9 reasons demand starts to pick up a lot faster than the
10 utility anticipated and as a result it finds itself
11 relying more and more on these CTUs while major supply
12 is being constructed. And it ends up that the
13 situation gets so bad that the utility finds it is
14 relying more and more on CTUs for purposes of base load
15 and intermediate generation.

16 I am wondering, in that situation, if you
17 would agree with me that any utility that has to resort
18 to using CTUs for base load plants, the result is going
19 to be a very high cost supply system?

20 A. Certainly in this part of the world.

21 Q. Would you also agree with me that
22 such a very high cost system as that should be avoided
23 because it also represents something other than an
24 optimum supply mix which is very important in utility
25 planning?

1 A. Yes. I guess one of the ways that
2 this can be handled with the options that we have
3 talked about is that the combustion turbine in your
4 hypothetical example could be converted to a combined
5 cycle whereby you would realize the additional
6 efficiencies that can be gained through that process;
7 and as a later phase, it could be converted to a coal
8 gasification combined-cycle unit, the IGCC option,
9 which is our phased IGCC option 8 in the thermal cost
10 review.

11 In that way we would realize the fuel
12 cost effectively would be based on coal prices rather
13 than gas prices. And that could result in a
14 cost-effective mix of generation in your hypothetical
15 example.

16 Q. I wonder, Mr. Shalaby, if you could
17 turn to Volume 109, starting at page 19198. This was
18 at the end of your evidence in chief, Mr. Shalaby, when
19 you were providing a summary and synopsis of this
20 panel's evidence.

21 Starting at line 24, you state:

22 And finally the choice of an
23 implementation for fossil options would
24 be made as needed. We are not at this
25 time requesting any approvals for fossil

1 facilities but we feel it is appropriate
2 to keep those options open to Ontario and
3 implement them as required.

4 Mr. Shalaby, does this statement mean
5 that while no express approvals are being requested for
6 fossil options at this hearing, Ontario Hydro does
7 expect this Board to make findings and recommendations
8 on whether fossil technology or fossil options are
9 appropriate for utility planning purposes in the
10 context of Ontario Hydro's 25-year plan?

11 A. To answer that, I would like to go to
12 Exhibit 452, which lays out what Ontario Hydro expects
13 in terms of approvals and in terms of findings.

14 [2:50 p.m.]

15 Q. Go ahead.

16 A. And there is something to that effect
17 in Exhibit 452. I just don't know my way about it too
18 quickly.

19 Q. There is an approval section on page
20 32.

21 A. That's right. Matters under
22 consideration by the Environmental Assessment Board.
23 The second last bullet on that page reads:

24 In electricity planning what is the
25 appropriate role of fossil generation,

1 particularly with respect to reliance on
2 gas and with respect to greenhouse gases
3 and related environmental considerations?

4 Q. So if I put to you that this Board,
5 Ontario Hydro is expecting this Board to make findings
6 on the rationale associated with the fossil fuel
7 options, can I take that from your statement in your
8 direct evidence?

9 A. It's getting legal, so I think we
10 will get legal counsel to...

11 MRS. FORMUSA: I guess Mr. Shalaby is
12 hesitating because of the word rationale. We have used
13 that word quite specifically in the approvals section.

14 I think rather than get into this any
15 further we might want to defer discussion of this
16 matter until March 9th, I think that's the date that's
17 been set aside.

18 The matters that are listed on page 32
19 are questions that the Board would likely be
20 considering in examining the range of alternatives. I
21 mean, Hydro proposes one plan to it, but obviously the
22 Board is entitled to look at alternative methods, and
23 that can include plans that have fossil.

24 My understanding is that those items
25 would be canvassed on March 9th and in the submissions

1 by the parties of February 28th. What we were trying
2 to do on page 32 is give an indication of some of the
3 considerations that I think are obviously before the
4 Board in light of the undertaking before you.

5 MR. RODGER: Well, I agree, Mr. Chairman,
6 that I think it's inevitable that on February 28th
7 these issues will be dealt with.

8 I just want to be clear of my
9 understanding of these witness' testimony in his direct
10 evidence.

11 MRS. FORMUSA: I don't object to any
12 questions about the direct evidence, but I think what
13 you were getting into, Mr. Rodger, was a legal question
14 that Mr. Shalaby quite appropriately referred to me.

15 THE CHAIRMAN: I understand the semantic
16 difficulty with the word "rationale" because that
17 impinges on discussions of approvals and so on.

18 I think the line of questioning is
19 appropriate because it would assist the parties to
20 prepare for the March the 9th session if they had a
21 clearer indication than they now perhaps from 452 as to
22 what exactly Hydro sees this hearing encompassing.

23 MR. RODGER: Q. I think given Mr.
24 Chairman's comments, Mr. Shalaby, could you then tell
25 me what you meant by your reference that I have pointed

1 out in the transcript?

2 MR. SHALABY: A. Perhaps I can refer you
3 to page 29 in Exhibit 452, that page shows something
4 called Sample Response Portfolios, and what that was
5 intended show is if certain risks occur such as higher
6 demand or lower demand management harvesting or lower
7 non-utility generation or higher, it was showing what
8 Hydro's response could look like. So, the third column
9 in that table entitled Response would show what Hydro
10 would do in certain eventualities. Most of those start
11 with build CTUs, the next one says build CTUs, plan for
12 IGCC combined cycle, install CTUs, shift to IGCC.

13 So many of the responses Hydro is seeing
14 here to respond to things that are going to be
15 different from a median plan vision at this time
16 involve implementation of fossil options. And for that
17 reason my testimony was saying that we envisage a role
18 for fossil options in the future and we would like to
19 see fossil options continue to be an open option for
20 Hydro, because we see them being used in many
21 instances.

22 Q. So to take that one step further from
23 your testimony, is Ontario Hydro expecting that this
24 Board will say, yes, fossil is a building block that
25 could be used in the future. We have considered it

1 based Ontario Hydro's evidence, while the need question
2 isn't being addressed at this hearing, in terms of a
3 building block for utility planning, we have looked at
4 it, it's satisfactory it's a building block Hydro can
5 use, or it's not satisfactory and should be excluded
6 from future consideration.

7 Do I take that from what you have just
8 said; is that correct?

9 A. My answer to you, the planners at
10 Ontario Hydro would very much like to know whether
11 fossil is an option for the future or not. Whether it
12 will come via this hearing or some other mechanism,
13 it's something that again verges on the legal and
14 verges on the mandate of this hearing, and so on.

15 But it's certainly something that we have
16 asked the Board to look at, at page 32, and subject to
17 all the discussions that will take place on March 9th
18 and beyond, that would be determined.

19 But the straight answer to you, the
20 planners would like to know whether it's an option or
21 not an option, yes.

22 Q. Certainly from your perspective that
23 question should be addressed by this Panel at this
24 hearing?

25 A. I think our position on page 32 is

1 yes, but not everything we ask for gets done.

2 Q. I'm sorry?

3 A. Not everything we request gets down.

4 Q. No, that's true.

5 A. It is just a request at this stage.

6 If it's seen appropriate by this Board to answer that
7 question, that would be information that the planners
8 would find very valuable.

9 Q. I am just trying to pin down what
10 Ontario Hydro's perception is of what this Board can
11 decide on that issue, and I take your answer to be, yes
12 that is something that Hydro expects the Board will
13 answer, yes fossil is a building block for the future
14 or no it isn't?

15 A. I'm trying to walk a fine line of we
16 would find the answer very useful and very helpful.
17 Whether we expect or whether they will is not something
18 I can comment on.

19 Q. So you don't know as a planner for
20 Ontario Hydro what you would like the Board to answer?

21 A. No, I no what we would like them to
22 answer, but whether they will answer is something I
23 cannot comment on.

24 Q. But certainly you would like them to
25 answer that?

1 A. Yes.

2 Q. I just have one further question and
3 that was the question of clarification on the overhead.

4 THE CHAIRMAN: Yes. Have we got the
5 overhead now, SI? I guess we haven't got the equipment
6 lined up to put it up.

7 MR. RODGER: Perhaps it might quicker if
8 I just compared my --

9 MRS. FORMUSA: I think I can explain, if
10 I could just have a moment.

11 Mr. Rodger's eyes are probably the best
12 here he is the first one that saw this.

13 Yes, indeed, the overhead was different.
14 We inadvertently put in an older version of the
15 information that was on the overhead. It's essentially
16 the same information but I think you can see there is
17 some additional writing on it, and I will arrange to
18 have copies provided to all the intervenors. This is
19 the latest information.

20 THE CHAIRMAN: I'm sorry, I am not quite
21 sure I caught it. Which is the right one?

22 MRS. FORMUSA: The right one is the
23 overhead you saw. The hard copy in your package is the
24 older version.

25 We apologize for that error and thank Mr.

1 Rodger for pointing that out. I will have copies made
2 over the break and bring them into the room.

3 DR. CONNELL: That may have some bearing
4 then on Mr. Watson's questions.

5 MRS. FORMUSA: Yes, and I am showing it
6 to him.

7 MR. RODGER: Those are all my questions,
8 Mr. Chairman. I would just like to have a look at this
9 in case it does raise a further question, but for the
10 time being those are all my questions. Thank you.

11 THE CHAIRMAN: Mr. Cuyler, you are next.
12 ---Off the record discussion.

13 CROSS-EXAMINATION BY MR. CUYLER:

14 Q. I suppose my questions are primarily
15 for Mr. Shalaby because he dealt mostly with the
16 photovoltaic option, although, Dr. Effer, you did
17 principally the survey. So, whichever among you feels
18 most inclined to answer the questions, I will leave it
19 up to the two of you.

20 My understanding from Exhibit 344 and
21 your presentations was that Hydro's position on both
22 photovoltaic and wind generation was that they are too
23 expensive and due to the excessive cost their use will
24 be restricted to some fairly specific applications,
25 remote applications where no grid power is available,

1 and demonstration projects at what I am tempted to
2 euphemistically call conservation theme parks.

3 As far as real generating potential for
4 the grid and for massive use, in Exhibit 344 it has
5 called for a minimum potential, basically about 1
6 megawatt by the year whenever, with a maximum of 50 to
7 100 megawatts if everything goes wonderful for solar.
8 That essentially would characterize Hydro saying
9 photovoltaic is not, or wind for that matter, are not
10 really worthy of consideration at this time; is that
11 true?

12 MR. SHALABY: A. I think the beginning
13 of your summation is correct, but the latter part, it
14 is not worthy of contribution, is not right.

15 Fifty or 100 megawatts is \$150 or \$200
16 million worth of investments. Quite a big chunk of
17 electricity supply, and it is worthy of consideration
18 for the special needs that it can meet where major
19 generation cannot meet. It's in fact very valuable, if
20 it can go to a navigation buoy or a radio repeater or
21 something like that.

22 Q. Again, fairly specific remote site
23 applications though for --

24 A. Until the costs decline, yes. But we
25 clearly say that we expect sharp decreases in cost, and

1 depending on how that decrease occurs and when it
2 occurs, then the market share will increase as the
3 costs decline.

4 Q. Now, the cost numbers that you have
5 used for solar, the energy benefit and the capacity
6 credit, are derived from the cost of conventional
7 generation; am I correct in that?

8 A. Yes, you are.

9 Q. And then the renewable credit is
10 derived from the cost of conventional generation as
11 well because it's a percentage of the previous two, the
12 energy benefit and the capacity credit, so it too is a
13 factor of the conventional cost?

14 A. Right.

15 Q. Now, that 10 per cent for the
16 renewable credit, where did you come up with the number
17 10 per cent in its application to the energy benefit
18 and the capacity credit?

19 A. It's largely a judgment. Again I
20 realize you weren't here for the grueling months in the
21 summer when we talked about costing concepts, and that
22 premium was discussed at length at that time. But in a
23 nutshell it's a judgment call that would give us more
24 confidence that we are implementing renewable and
25 demand management options in preference to other supply

1 options.

2 Q. So, it's a number that can be used
3 but you would have difficulty quantifying that down to
4 9.9 or 10.1?

5 A. Absolutely.

6 Q. Just 10 for a number?

7 A. Yes.

8 Q. All right. Now, in one of the
9 previous forecasts you mentioned, and it is in Exhibit
10 344, the estimates on the costs of electricity are the
11 price of electricity will go up 25 per cent in the
12 first five years, and then there will be no increase
13 for 14 years.

14 A. Can you help me, where that is
15 exactly, in 344?

16 Q. Let me see. If I go through my
17 little papers here. Where are we here.

18 No, I don't have that noted. Sorry. Not
19 on these papers. Probably the ones back on the desk.

20 I would suspect it's probably in the
21 opening section, under the introduction and the
22 summary, the Roman numeraled pages at the very
23 beginning of 344, there is a section in there which is
24 titled Estimates of Cost of Electricity, I'm sorry
25 there are two different places where it's noted and I

1 don't have either one.

2 THE CHAIRMAN: Do you have 344 with you?

3 THE CHAIRMAN: Would it help you if you
4 had a copy of 344?

5 MR. GREENSPOON: Mr. Chairman, I believe
6 it's in the update to the load forecast. I don't want
7 to assist the questioner --

8 MR. CUYLER: Go ahead.

9 MR. GREENSPOON: I just happen to know
10 where it is.

11 THE CHAIRMAN: What page?

12 MR. GREENSPOON: It's on page 3, I think
13 what is called 452A. Update to the 1991 long-term load
14 forecast.

15 THE CHAIRMAN: All right.

16 MRS. FORMUSA: That's Exhibit 467.

17 MR. CUYLER: Sorry about that.

18 THE CHAIRMAN: Perhaps you could just
19 repeat it.

20 What is the 25 per cent again?

21 MR. CUYLER: The heading is called
22 Changes in Energy Price Forecast. It says:

23 The real price of electricity is now
24 forecast to increase about 25 per cent in
25 the first five years of the forecast,

1 then stabilize for 14 years before rising
2 another 6 per cent between 2009 and 2015.
3 The 1990 forecast assumed a 10 per cent
4 increase between 1990 --
5 Anyway, that's the 1990 forecast. The
6 new one says 25 per cent in five years with no increase
7 for 14 years and then another 6 per cent in the
8 following six years. Four per cent per year
9 essentially.

10 Q. I found that quite curious. Can you
11 name three things that haven't gone up in price over
12 any 14 year period in recent history?

13 It seems like a rather optimistic
14 forecast to me.

15 MR. SHALABY: A. This sounds like CHUM
16 FM name five things in five seconds. [Laughter]

17 Q. I encountered the number and strikes
18 me as, if you will forgive me, wildly optimistic.

19 MR. ROGERS: Natural gas would be one,
20 sir. [Laughter]

21 MR. SMITH: I was just about to say that,
22 way to go.

23 I think you have to put it in context.
24 It's real price increase, not just price increase. So
25 the flat line for 14 years assumes increases at the

1 rate of inflation. Put that into context there are a
2 lot of things that have not got up in price at the
3 price of inflation over the last ten years.
4 Unfortunately, electricity isn't one of them.

5 MR. CUYLER: Q. No, electricity is one
6 of the things that has gone up.

7 I am assuming then that these numbers are
8 correct, and I'm not certain that any forecast is
9 correct. I don't know that anybody here would bet the
10 bank on an economist prediction for this economy or any
11 other economy, at least if you had any money in the
12 stock market in '89 you might not.

13 Any increase in costs beyond these
14 parameters here, like if there is an increase over that
15 14 year period, then that would have a direct effect on
16 both the energy benefit and the capacity credit as
17 applied to solar, because that's the cost of
18 generation; am I correct?

19 MR. SHALABY: A. In an indirect way,
20 yes. Again, the story is more complicated than that,
21 but in an indirect way, yes.

22 Q. So if this zero per cent increase is
23 not the case that we see during that time period, then
24 solar could in fact incur cost benefits on that
25 cost/benefit ratio thing that you went through as a

1 result of the increasing costs of conventional
2 electricity because the numbers that you apply to your
3 cost/benefit are derived from the cost of generating
4 conventional electricity?

5 A. You are correct. The only
6 complication that I am trying to alert you to is that
7 it is not the price of electricity that we base the
8 benefits on. It is what we call the avoided costs of
9 additional electricity generation, and those concepts
10 are linked somewhat but they are not identical.

11 Q. That is fine?

12 A. For the purposes of your discussion
13 we are on the right track, but I don't want to
14 over-complicate matters.

15 Q. That's okay. So, the only thing I
16 just wanted, so there is conceivable cost/benefit and a
17 change to that cost/benefit ratio which would issue
18 from any increasing cost from conventional generation?

19 A. Yes.

20 Q. Now, is there in the conventional
21 costing a possible deferral of costs not yet known? I
22 am curious, for instance, you are referring to a panel
23 that I wasn't at. In the costing of nuclear power, for
24 instance, how do you account for taking care of that
25 radioactive waste for thousands and thousands of year

1 that we are told it's going to be necessary? We don't
2 know these costs so how do you --

3 A. We make assumptions about what these
4 costs will be and there are provisions in our rate
5 collection. We are collecting money today to take care
6 of that future waste. So there are provisions being
7 made for the disposal of that waste. They are based on
8 assumptions on how that waste will be stored and
9 disposed of, and that matter is reviewed periodically
10 at the OEB and elsewhere.

11 [3:09 p.m.]

12 Q. And any changes if those assumptions
13 should prove potentially inadequate in terms of
14 environmental safeguards and standards, those costs
15 could increase in dimensions which are unforeseen at
16 this time.

17 A. Yes.

18 Q. I just note that the federal
19 government is holding an environmental assessment
20 review of the waste disposal plan that is proposed for
21 the radioactive waste.

22 A. That is correct.

23 Q. And so there are no firm decisions on
24 what will be done yet or --

25 A. No, there are not.

1 Q. Does the renewables credit account
2 for the cost of replacing the non-renewables at all or
3 does this 10 per cent number -- I mean, does it account
4 for what are we going to do without the gas, the coal,
5 or the non-renewable assets?

6 A. No, it doesn't attempt to do that.

7 Q. Okay. Is there any accounting in the
8 cost of conventional generation for cleaning up the
9 environmental damage from other generational
10 technology?

11 I note from the fossil discussions, the
12 presentations that you people have made here that while
13 you are making major reductions in the amount of
14 pollutants, there are only two technologies which are
15 addressed so far which have no environmental or
16 negligible -- I shouldn't say no, negligible
17 environmental contamination as a result of their use.

18 Is there any costing on -- any inclusion
19 in the costs of conventional generation of
20 environmental clean-up that may be necessary in order
21 to, say, remove acid soil?

22 A. I don't know about that specifically
23 but there are costs included for mitigation of
24 emissions and wastes as this panel has testified:
25 scrubbers, ash treatment, water treatment and so on.

1 There are always residual impacts. After
2 all the control equipment is put on the fossil plants,
3 there are residual impacts that escape into the
4 atmosphere and into the ecosystem in different places.
5 We have gone through a discussion of what is the cost
6 to society of that residual impact. So again I hate to
7 tell you that the show was a little earlier --

8 Q. That's just fine.

9 A. I'm finding that one of the things
10 you do at a later panel is you say, "We said that
11 before."

12 Q. I have heard it from other comments,
13 yes.

14 A. We discussed it and there were views
15 in different ways of the appropriate way of accounting
16 for those residual impacts. And Hydro stated that we
17 account for the impact of those residual impacts in an
18 judgmental way. We try to minimize them to the extent
19 we can. And then on top of that, we give preference to
20 options that do not result in those residual impacts.

21 Q. So, from what you have just said, you
22 would give preference, the cleaner the technology the
23 more preference you would give to it?

24 A. With a limit of 10 per cent.

25 Q. Can I take that from your last

1 sentence?

2 A. With a limit of 10 per cent.

3 Q. With a limit of...?

4 A. With a limit of 10 per cent
5 preference.

6 Q. So you apply a 10 per cent weight to
7 your decision according to -- the environmental
8 consideration is something that you consider worth sort
9 of 10 per cent of the mark that you would apply to a
10 technology as far as its desirability. Is that my
11 understanding of that 10 per cent number you have just
12 handed me?

13 A. I hesitate to adopt all of your
14 description of that.

15 Q. Feel free to put it in your own
16 words.

17 A. It's an indication of preference for
18 technologies that have less environmental impact. It's
19 a preference. We prefer technologies that are
20 renewable, for example, and the extent of the
21 preference is 10 per cent on cost.

22 Q. And the extent of the preference....
23 Forgive me for dwelling on this. But I at this point
24 fail to comprehend what you mean by the extent of the
25 preference is 10 per cent. I tried to put it in my

1 terms to say when you consider an option, you would
2 prefer something that has an environmentally benign
3 activity.

4 A. Yes.

5 Q. But that is not your -- it is nowhere
6 near the prime consideration. Like 90 per cent of the
7 consideration is on other factors.

8 A. See the other option --

9 Q. Sorry?

10 A. The other options all meet
11 environmental regulations and requirements and at times
12 exceed the environmental regulations and so they better
13 the environmental regulations and requirements.

14 So the choice here is between options,
15 all of them meet environmental regulations.

16 Q. Meeting the regulations is somewhat
17 different from having zero environmental --

18 A. Yes. And that is where the 10 per
19 cent comes in. Those who do better than even meeting
20 regulations, we accredit 10 per cent to them.

21 Q. You accredit 10 per cent of what?

22 A. Of the costs of conventional sources.
23 If the conventional source would cost 9, we would be
24 equally comfortable with demand management or
25 renewables at a cost of 10. That's the 10 per cent.

1 Q. So in effect then, the concern over
2 environmental purity is a 10 per cent factor in the
3 decision. That's essentially what you have described
4 to me here.

5 A. Well, again those words are difficult
6 to accept.

7 Q. You don't like my description. All
8 right. I won't dwell on it any further.

9 A. It's your statement. I will leave it
10 there.

11 Q. I won't go into that any further.
12 Where are we here? It's always too
13 expensive, the cost numbers....

14 Now, the costs associated with solar
15 electric are principally capital costs; am I correct in
16 this?

17 A. Yes.

18 Q. They are almost exclusively capital
19 cost?

20 A. Almost exclusively, yes.

21 Q. And the prices that are paid for
22 those capital investments are appropriate to small
23 scale purchases? I am referring to -- perhaps I should
24 elaborate here. The difference in price, what I am
25 getting to here is the difference in price between

1 purchasing one system and purchasing a thousand systems
2 or purchasing 10,000 systems, the prices that are used
3 for costing the solar electric option are the prices
4 that Hydro has incurred in installing small systems.

5 A. That is correct.

6 Q. So this is sort of the price of a
7 one-off.

8 A. So far we have bought one-off, yes.

9 Q. Now, I don't know how many of us in
10 this room are familiar with this, but I feel certain
11 that I could -- like, for instance, Mr. Smith, I think
12 you are in charge of fuel purchases.

13 MR. SMITH: A. Yes.

14 Q. Now, if you were to buy one bag of
15 coal, you would probably pay somewhat more per pound
16 than by buying a train load; am I mistaken? Pardon me,
17 you would pay somewhat more.

18 A. I wouldn't disagree with you, that's
19 right.

20 Q. And that the variation in price on a
21 unit like on a per pound price might be substantial--

22 A. Yes.

23 Q. --on a small purchase versus a large
24 one?

25 A. Yes.

1 Q. So given that what you have costed on
2 the solar electric option is one-off experimental
3 units, and what we are considering here in the
4 demand/supply hearings is a much larger demand, and
5 hopefully a much larger supply to meet it from whatever
6 means the panel decides are most appropriate, it
7 doesn't seem quite fair to compare mass purchase
8 options with a one-off experimental.

9 MR. SHALABY: A. I think I mentioned the
10 idea of we expect the costs to decline between now and
11 the year 2000 in a significant way. And one of the
12 reasons for that decline is increased
13 commercialization, increased market. The more
14 manufacturing takes place, the lower the price will be.
15 So we are taking into account that increased
16 commercialization in the prices for the year 2000.

17 In 1991 some of the figures that we put
18 in there are based on our experience in purchasing
19 systems in the early 90s. And I don't disagree with
20 you: If there is a volume purchase, perhaps the price
21 will be lower.

22 Q. So, the costs that you are basing the
23 cost/benefit ratio on, the benefits are being compared
24 to conventional generation through what I will term
25 economically viable means of generation: the

1 traditional hydro, the existing nuclear and fossil
2 stations. But the costs supplied to solar are being
3 weighted by the one-off increase in price.

4 A. Only in 1991 and I don't know to what
5 extent it's rated by a one-off kind of thing. It's
6 based on recent experience, that's all.

7 Q. Recent experience with a one-off
8 purchase. I just wonder why Hydro didn't price out
9 what it would have cost to do something a little more
10 substantial. Perhaps the manufacturers won't offer you
11 a discount if you purchase a hundred thousand systems.
12 And then again maybe they might. I am just curious--

13 A. I don't know.

14 Q. --why that option wasn't pursued.

15 A. I think it's pursued more in the year
16 2000 snapshot when we expect prices to come down
17 because of manufacturing efficiencies, because of
18 material development, and because of increased
19 commercialization.

20 It is a hypothetical now to say what will
21 it cost if the systems are bought en masse rather than
22 one at a time. I don't know how to answer that. It
23 would be a lower price but I don't know what that price
24 would be.

25 Q. What I am trying to get to here is

1 that while I agree with you that by the year 2000 the
2 prices will drop, or at least we are both hopeful in
3 the same direction in regards to that matter, that when
4 you provide us with a cost/benefit number of 2.2 for
5 now or two point -- and say photoelectric solar is not
6 viable at this point, that number is based on limited,
7 at best, financial inputs because the research to what
8 it would actually cost to go at solar hasn't been done.
9 It seems fairly superficial, this number, this one-off
10 number being applied to extrapolate to a larger scale.

11 A. The cost/benefit ratio is 7.7--

12 Q. 7.7, fine.

13 A. --in 1991. And given that it is so
14 high, the judgment of the people who did this is that
15 it's indicative enough that it is expensive.

16 Whether mass purchase will bring it down
17 to 5.2 or something of that nature, the conclusions
18 will not be affected materially. So I think there is a
19 limit to the number of questions and the number of data
20 points one would gather if the utility for decision
21 making is not there, and I think that must be the
22 conclusion we have to reach here. It is very expensive
23 and if it's mass purchase, it will be just as
24 expensive. So the conclusion stands.

25 Q. Maintenance costs. There are no

1 maintenance costs with this stuff essentially.

2 Cleaning and inspection; is that it?

3 A. We assumed a small amount as you
4 might recall in the overhead that I put up and on page
5 35 of Exhibit 344. A small amount. Really cleaning
6 and guarding and things like that.

7 Much of the cost to my knowledge comes
8 with replacements and maintenance to the inverter
9 systems to the electrical conditioning part of the
10 equipment, not to the solar cells themselves.

11 Q. Maybe this is an opportunity. I
12 wanted to deal with the inverters and converter aspects
13 at some point anyway, so we can go into that now
14 perhaps if you would like.

15 You mentioned that inverters are
16 expensive and that they are a substantial portion of
17 the cost of a system. Are you aware of a number of
18 factors that have led many of the people who are living
19 with photovoltaic site generated electricity for their
20 own household needs to disregard the inverter?

21 I would point to the wide-spread, I
22 shouldn't say wide-spread, but ready availability of 12
23 volt direct current appliances, refrigerators, tools,
24 motors, fans. So it's quite possible to operate what
25 one would call a completely modern contemporary home

1 with a vast majority of what one would call the
2 electrical conveniences without any need for an
3 inverter at all.

4 A. I wasn't aware of the extent of sort
5 of the equipment available on 12 volts. I know there
6 are some things at 12 volts but I didn't realize it's
7 that widely spread.

8 Q. Vacuum cleaners, blenders, what do
9 you want? It's all there.

10 The other aspect to line conditioning,
11 and I am not certain in what panel this may have been
12 dealt with, is that a number of users of 12 volt DC
13 systems have expressed to me that one of the reasons
14 that they dodge the inverter to 110 AC was that AC
15 current is currently under some implication of being
16 involved with health hazards related to the
17 electromagnetic fields that are concurrent with
18 alternating current and are almost not present or
19 negligible in their metering from low voltage direct
20 current systems. And so there is a safety factor or a
21 health factor to be considered when avoiding the
22 inverter and going to 12 volt DC.

23 A. That's an interesting factor that
24 people consider, yes.

25 Q. So the inverter expense of the

1 photoelectric option is not unnecessary. It is
2 convenient in the sense that one could then keep all
3 the appliances that we have accumulated for use on grid
4 power but it is not a necessary part of the costing?

5 A. I think it is not a necessary part if
6 the decision is to completely sever from the grid for
7 backup or for any other purposes. If you are
8 completely self-sufficient, then perhaps that is a
9 proposition.

10 To my knowledge, most people would use
11 photovoltaics together with a grid or perhaps go to the
12 grid at times of high demand or times of failure of the
13 system for any reason or batteries have run out. It
14 could be cloudy for several days in a row. I am not
15 aware of people who adopted photovoltaics completely
16 isolated from the grid for any sizable establishment.
17 I am not aware of that.

18 Q. Most of the remote houses are indeed
19 using a hybrid system of one sort or another. Even the
20 off-grid people are either using a fossil-fuel
21 generator or wind generation, which apparently is
22 really quite -- when it's stormy and cloudy and you
23 don't get the sunshine, strangely enough you do get the
24 wind.

25 You're a very good answerer. You are

1 leading me in one of two directions to the next
2 questions I have for you.

3 Now, at the Mississauga, the 5-kilowatt
4 house in Mississauga, where Hydro has been monitoring
5 it but it is not specifically a Hydro installation,
6 during conversations with some of the people in your
7 department, not your department, but Ontario Hydro,
8 Purdrues and his boss, who are working in the
9 photovoltaic field, they have expressed to me that that
10 5-kilowatt installation in Mississauga is currently
11 providing about 60 per cent of the annual energy use
12 electrical energy use of that house.

13 Now that is despite the fact that that
14 house has three energy inefficient refrigerators, a
15 freezer, and what I will term antiquated lighting. And
16 it's not like a perfect house in terms of its energy
17 use by any means but certainly by contemporary
18 research.

19 Now, that 60 per cent to me looks like a
20 big chunk out of the residential demand for Hydro's
21 load production.

22 A. If that were to be duplicated in
23 every house, it would be a big chunk.

24 Q. Or even a small percentage of houses,
25 would that not free up a substantial amount of

1 electricity for the bulk users who need the bulk
2 generation?

3 A. Yes, it would.

4 Q. Given that and what is noted as a
5 public expression of acceptance for solar electric,
6 people regularly pay premium price for goods and
7 services, which are perceived to be either better
8 quality or more aesthetically pleasing. There are not
9 more than maybe one or two of us in this room who is
10 driving the cheapest vehicle available.

11 A. You haven't had a ride with me for a
12 while, have you. Maybe I am one of the two. (Laughter)

13 Q. Nonetheless we have, as one looks
14 around the society, one sees that there is a broad
15 range of goods available and that not everyone buys the
16 cheapest thing available.

17 A. I accept that. Yes, I accept that.

18 Q. And that there is a broad social
19 acceptance for environmentally benign technologies and
20 people are indeed prepared to pay a premium for
21 recycled products, recyclable products.

22 A. Again some people. I don't know the
23 extent of that being universal.

24 Q. I wouldn't conjecture either. I
25 wouldn't ask you to make a conjecture in that regard.

1 Somebody may know it but I don't expect you to be the
2 person with that number.

3 A. Okay.

4 Q. Now given that, why isn't Hydro more
5 serious about pursuing a mass distribution of
6 photovoltaic power?

7 [3:30 p.m.]

8 What you have said about cost, it is more
9 expensive. People are prepared to pay more money.
10 That doesn't justify it to me.

11 It can take 60 per cent of a household's
12 demand on the electrical grid away from the grid. So
13 when is Hydro going to get serious about this?

14 A. Again, not to appear unaccepting of
15 the 60 per cent, first of all --

16 Q. It is just a number I am taking from
17 your people.

18 A. My understanding of that particular
19 house is that there is an awful lot of land area
20 covered with photovoltaic cells. This is not just a
21 panel on the roof. This is the entire back yard
22 covered with photovoltaic cells, and I am not sure to
23 what extent that will gain acceptance.

24 The price of these things is fairly high
25 and you have to have the right orientation and you have

1 to have the right land area. So extrapolating that one
2 house to any more is not a straightforward matter.

3 But given that you could save some demand
4 in residential homes, your question is, why don't Hydro
5 assist people in making that move. Is that what you
6 are saying?

7 Q. We have talked before. What I am
8 headed to is, while the cost of photoelectric
9 generation is high, if there is a public acceptance for
10 the technology, can we not transfer some of the capital
11 cost from Hydro to the public by having a lease
12 arrangement, that's only one of many options I am sure
13 that other people could come up with, but a simple
14 lease arrangement where Hydro would use its resources
15 to facilitate a bulk purchase at the most advantageous
16 pricing available, and then lease those systems to
17 homeowners who would be willing to participate in this,
18 thereby essentially, because of homeowners are now
19 paying for the system, Hydro's contains generation
20 capacity, gains electrical capacity because you no
21 longer have that load, whether it's 60 per cent or 40
22 per cent, and while you are correct in your view that
23 this is an awful lot of photoelectric cells in this
24 back yard, it's a grossly inefficient house.

25 So there are trade-offs to be made by

1 having the houses specifically sited and appropriately
2 designed so that they work efficiently, and the amount
3 of photoelectric cells that are necessary on the roof
4 to operate a given percentage of that house's load
5 requirements.

6 A. Again, at the risk of sounding
7 repetitive, in Panel 3 we discussed the criteria that
8 we used in deciding whether or not to get into a demand
9 management, and that falls more as a demand management
10 option. We looked at it from a total customer
11 perspective. If total customer cost is reduced by
12 photovoltaics Hydro will get involved in the option.
13 If total customer cost is not reduced we do not get
14 involved.

15 In simple terms, if the photovoltaic
16 option is cheaper than doing other things we will get
17 involved, and at this time we don't think it's cheaper
18 than other things and that's why not we are involved.

19 We could encourage people to buy
20 photovoltaic cells, but we have put rules for ourselves
21 that we will not encourage things that exceed the cost
22 of the alternatives.

23 Q. All right.

24 A. We are not in the premium quality,
25 high cost options that people are accepting for other

1 reasons, that it is not a business that we are in.

2 If it's the same cost we will encourage
3 it; if it's a product that you liked for other
4 attributes, because of other attributes, we will leave
5 that to the customer to implement.

6 Q. So essentially then, Hydro is
7 prepared to wait through whatever assortment of forces
8 are applied, whether it's a more than zero per cent
9 rise in the real cost of electrical generation over
10 that 14 year period, or a manufacturing efficiency
11 materials change in the development of photoelectric
12 cells that would bring the cost of those down. Until
13 external forces bring the cost of photoelectricity down
14 to below current costing, you don't really wanted to be
15 involved in suggesting to people that these cleaner
16 technologies might be desirable, is this --

17 A. Two things on that. Weight is one
18 way.

19 The other way, if we believe that our
20 involvement will bring the costs down, I think we will
21 consider getting involved. If we become convinced that
22 by Hydro entering that business the costs will come
23 down and it will become competitive, we will get into
24 that business. We are not convinced of that at this
25 time.

1 The second point you mentioned is talking
2 to people about whether it's a desirable option or not,
3 I think our report and people who phone us, and there
4 are hundreds of people who phone Hydro every year
5 inquiring exactly about how to photovoltaic system up
6 and we send them brochures and information and put them
7 in touch with manufacturers and suppliers. We would
8 encourage people to do, it's just that our mandate to
9 provide service at low costs, we don't see that
10 compatible with providing something that's much more
11 expensive than the alternatives.

12 So we would help people and we would
13 point out the benefits, but we would also point out
14 that it is expensive at this time. If they wish to do
15 it we will help them do it, but not financially. We
16 would help them by information, putting them in touch
17 with the industry, but not financial incentives at this
18 time.

19 Q. So you are essentially saying that
20 electrical generation as decision of Ontario Hydro is
21 principally an economic orientation.

22 A. Economics is a big part of it. It's
23 not principally economic, but economics is not an
24 insubstantial part.

25 Q. The 10 per cent is all that you would

1 grant to an environmental consideration above and
2 beyond any economic consideration?

3 A. I was reluctant to accept that --

4 Q. I know, all right.

5 A. Ten per cent above our clean
6 generation technology that we put on line, yes.

7 Q. Okay. The only other thing I would
8 point out here is that in the wind solar hybrid you
9 mentioned that 300 kilowatts is just about an optimize
10 size for a wind generational unit?

11 A. Three to 600, I think was my
12 testimony.

13 Q. Three to 600, in that range.

14 A. It's not in the wind solar hybrid, I
15 said in the wind farms.

16 Q. You said in the wind.

17 A. Yes.

18 Q. Now, that wind generation size is
19 just about neighbourhood size. I just point that out.

20 If Hydro ever decides to go serious and
21 try something like a solar electric neighborhood, may I
22 suggest that a hybrid with wind and one of your 300- to
23 600 kilowatt wind generators will probably provide you
24 with a grid independent subdivision.

25 A. With batteries and other things to go

1 with it.

2 Q. Well, you need batteries in each
3 household to get you through the intermittent periods
4 and nighttime yes, but that's the way it goes.

5 I have no further questions.

6 THE CHAIRMAN: Thank you, Mr. Cuyler.

7 DR. CONNELL: Mr. Shalaby or Dr. Effer,
8 if you take Mr. Cuyler's proposition, let's suppose
9 that it proved to be feasible for Hydro to intervene as
10 the agent in purchasing and distributing photovoltaic
11 facilities on the scale of, let us say, 1,000
12 megawatts. On the basis of your present knowledge, do
13 you think that that would stand up to the environmental
14 tests that you might put it to?

15 DR. EFFER: As I mentioned in the direct
16 evidence, Dr. Connell, I said that if any given
17 alternate technology came to occupy more than a given
18 percentage, a small percentage of the actual
19 generation, then new environmental considerations would
20 come into play, and I mentioned aesthetics, land use.

21 Depending again on how this block of
22 power were distributed, I think these factors would
23 come into the purview of the Environmental Assessment
24 Act in the way that if it was operated by a body that
25 was responsible for the maintenance and operation of

1 that facility, and if that were Ontario Hydro, I think
2 we would be subject to the Environmental Assessment
3 Act.

4 DR. CONNELL: In spite of the emissions
5 question on which your testimony is very clear, it's
6 not a foregone conclusion then that installations on
7 that scale would be acceptable.

8 DR. EFFER: I think we would have to
9 leave that up to our provincial government to decide
10 eventually on whether that kind of generation would be
11 subject to the Act or not.

12 DR. CONNELL: Thank you.

13 MR. SHALABY: I think, in fairness, if
14 you envisage mounted on the roof tops, operated by the
15 homeowner, small panels at a time, all indications are
16 that would be environmentally acceptable, provided the
17 batteries are kept well and disposed of well, and the
18 panels are recycled or disposed of in a convenient
19 manner, there should be acceptance of that.

20 It's when you start using large land
21 areas for massive tracts of photovoltaics -- most of
22 the photovoltaic industry people are not envisaging
23 that to be the way that photovoltaic will make a market
24 share. It will be roof tops and that regard I think it
25 is quite acceptable, providing materials are handled

1 well, batteries and panels.

2 THE CHAIRMAN: Do you have any further
3 questions you want to ask the panel?

4 MR. CUYLER: I suppose there is only one
5 thing I have forgotten mention.

6 THE CHAIRMAN: Go ahead.

7 MR. CUYLER: I suppose I could put it in
8 the record now.

9 As far as roof top installations are
10 concerned, they are fine. They are a trifle primitive
11 and about 30 per cent less efficient than something
12 with a tracking mechanism on it.

13 In the review, 344, you mentioned the
14 high cost of complex tracking mechanisms, and complex
15 tracking mechanisms, while they are popular with the
16 scientific community, are not at all the rule by virtue
17 of their excessive cost.

18 Among the PV using community what is much
19 more popular is a contained gas, dual canister tracking
20 mechanism which follows the sunlight on a single axis
21 and is a bonus of about 30 per cent to it's
22 generational output, again probably having that sort of
23 an impact on the cost of the system. Because instead
24 of having to have 30 per cent more panels on a flat
25 roof, you can decrease this.

1 It does have the aesthetic concern that
2 Dr. Effer mentioned in that it becomes something like
3 your satellite dish in your backyard where maybe your
4 neighbours don't like this thing spinning around.
5 That's all.

6 THE CHAIRMAN: Thank you, Mr. Cuyler.

7 We will adjourn now for 15 minutes and
8 then, Mr. Rogers, you are reading to go?

9 MR. ROGER: Yes, Mr. Chairman.

10 THE CHAIRMAN: How long do you expect to?

11 MR. ROGER: I would think perhaps 30/35
12 minutes.

13 THE CHAIRMAN: Thank you.

14 THE REGISTRAR: Please come to order,
15 this hearing will recess for 15 minutes.

16 ---Recess at 3:45 p.m.

17 ---On resuming at 4:00 p.m.

18 THE REGISTRAR: Please come to order.

19 This hearing is again in session. Be seated, please.

20 MR. ROGER: Good afternoon, Mr. Chairman.

21 THE CHAIRMAN: Go ahead, Mr. Chairman.

22 CROSS-EXAMINATION BY MR. ROGERS:

23 Q. Gentlemen, my name is Don Rogers and
24 I represent the Ontario Natural Gas Association. I
25 have a few questions for you.

1 Starting with you Dr. Effer, if I could.

2 I would like to just talk to you for a moment about
3 something that you said the other day about
4 interruptible gas availability. I can refer you to the
5 transcript if you like. It's a very short excerpt.
6 It's in Volume 109, at page 19054. You said there, as
7 I understand from reading the transcript, that Ontario
8 Hydro has changed its position somewhat from the
9 original work that you did in the thermal cost review
10 and the Demand/Supply Plan because you now you believe
11 that interruptible natural gas can be delivered, or you
12 thought at the time that interruptible natural gas
13 could be delivered at the time of winter peak, but now
14 you think that it might be rare when natural gas could
15 be delivered during your winter peak period.

16 DR. EFFER: A. I don't believe this
17 direct evidence was mine.

18 MR. SMITH: A. I believe that was me,
19 Mr. Rogers.

20 Q. Oh, I'm sorry, Dr. Effer. I didn't
21 think Mr. Smith would say something like that.

22 [Laughter]

23 THE CHAIRMAN: You set that up, Mr.
24 Rogers. [Laughter]

25 MR. ROGERS: Q. Well now, Mr. Smith, do

1 I understand correctly that Ontario Hydro when it did
2 its original Demand/Supply Plan did not realize that
3 interruptible gas could be interrupted?

4 MR. SMITH: A. No, I think we realized
5 it could be interrupted.

6 Q. What did you find out that you didn't
7 know at the beginning?

8 A. I think we, in discussions with the
9 gas industry, began to explore service conditions in
10 more detail and determine that in fact the likelihood
11 of interruption at the time of our needs would be much
12 higher than the assumption used in the original
13 Demand/Supply Plan.

14 I think we basically assumed 5 per cent
15 of the supply for a CTU would be oil and 90 per cent,
16 95 per cent gas, and we have now changed it to be
17 50/50.

18 Q. Okay, fine. I understand.

19 So you always had it in mind that you
20 would have dual firing capacity in your CTU units?

21 A. Yes.

22 Q. The only thing that has changed that
23 you now assume that you will use more oil than
24 originally contemplated?

25 A. That's correct.

1 Q. You now believe that it will be about
2 50 per cent oil, 50 per cent gas?

3 A. Yes. That's what we used for
4 purposes of costing out the options. It's not that
5 refined. That's, of course, using a 10 per cent
6 capacity factor of the unit which would be only on the
7 peaking hours.

8 Q. That's the assumption, though, that
9 you have used for the costing comparisons that you have
10 done in Exhibit 471, which is the overheads, I think,
11 that you used during your direct testimony.

12 A. Yes.

13 Q. They were someone's overheads. They
14 are not my overheads, I don't think, but yes.

15 Q. Well, the panel's. When I say yours
16 I mean the panel's.

17 A. Yes, That's right.

18 Q. Could you turn to page M11 of Exhibit
19 471, please. One of your colleagues could help you
20 here if this table was prepared by someone else.

21 This shows a comparison of LUEC costs, as
22 I understand it?

23 A. Yes.

24 Q. And if I read the graph on the
25 right-hand side of the page, the bar chart, it shows

1 the change in the LUEC figure by virtue of this changed
2 assumption concerning the amount of oil that you will
3 burn; is that right?

4 MR. MEEHAN: A. Yes, that's correct.

5 Q. At least with respect to No. 5,
6 option No. 5, let's look at that one. That is a gas
7 CTU, you are now assuming that you will burn 50 per
8 cent oil in that application whereas before you were
9 assuming, what, 5 per cent, 10 per cent?

10 A. That's right, of the 10 per cent
11 capacity factor. Of the 10 per cent capacity factor we
12 were assuming 5 per cent would be oil, and the other 95
13 per cent of the 10 per cent would be interruptible gas.

14 Q. Right.

15 A. In the update we are assuming that
16 half of the 10 per cent capacity factor would be oil
17 and half would be gas.

18 Q. I understand. And does that increase
19 in the use of oil account for the increase in the unit
20 price from 11.6 to 13.3?

21 A. That's most of the increase.

22 Q. So, to the extent that you have
23 overstated the amount of oil that you will use, the
24 differential will decline.

25 Put another way: If you are able to use

1 less than 50 per cent oil, the cost will go down?

2 A. That's correct.

3 Q. And the more gas you use, the lower
4 the cost will be?

5 A. That's true.

6 Q. I suppose gas also produces fewer
7 noxious gases than oil in its consumption; does it not?

8 A. Yes.

9 Q. So to the extent that you use more
10 gas than oil, it will be better for the environment?

11 A. There is a environmental advantage to
12 that, yes.

13 Q. How did you hit on the 50 per cent
14 figure?

15 MR. SMITH: A. I think I should answer
16 that because I think we advised you on using that,
17 unless you would like to try it and then I could add to
18 it.

19 MR. MEEHAN: A. Maybe I can try it and
20 you can add to it, Mr. Smith.

21 If you look at figure M2 in Exhibit 471,
22 theoretically what we did, and we didn't do this in a
23 rigorous way, but we looked at where the 10 per cent of
24 the hours might be in the year, and if you could draw a
25 line horizontally across there and pick up 10 per cent

1 of the black area that's representing the load there,
2 this would be a very rough approach, you would find
3 that most of that load is in the wintertime, so it's
4 mostly in January and a bit in February, some in
5 December.

6 Q. That is to say, if I can slow you
7 down there, Mr. Meehan, you will use the CTU unit most
8 often in the wintertime?

9 A. That's what I am saying, yes.

10 Q. And most often in what month,
11 December?

12 A. No, January, I think, and February
13 even heavier than December.

14 So looking at that and doing some work
15 again not in a rigorous way but in talking to our gas
16 people at Ontario Hydro, we found that our usage of
17 course coincided with the usage of natural gas because
18 it's the cold days that cause the load to be high, and
19 it was that that lead us to believe that the 5 per cent
20 and the 95 per cent ratio was incorrect, and we came up
21 with a 50/50 split. It's a bit arbitrary. There was
22 some work done on it.

23 Q. But Ontario Hydro came up with the
24 split, not the gas industry, for example?

25 A. I don't think we involved the gas

1 industry except perhaps to -- I am sorry, I can't
2 answer that.

3 Q. Do you know, Mr. Smith?

4 MR. SMITH: A. Well, it was our input
5 based on our discussions with the gas industry and
6 based on our own internal knowledge of the industry.

7 One of the things that we definitely
8 considered and when we are looking at an option we
9 don't know where it would be sited, but the
10 availability of interruptible gas would clearly be more
11 likely to be available if the facility was located in
12 the areas of, say, the Union Gas system where there is
13 ample storage and very close proximity to pipelines, et
14 cetera. And the further east you go on in the province
15 the more difficulty you would have getting
16 interruptible supply.

17 So, this is a very generic kind of option
18 that we have looked at. So, we have taken into account
19 that some portion of the time in fact you would be able
20 to get interruptible gas even at the time of peak were
21 the unit located in a certain part of the province, but
22 there would be other times that even if it was located
23 there, you would likely be interrupted.

24 [4:11 p.m.]

25 So taking all that into account, and as

1 Mr. Meehan said, ultimately arrived at as a reasonable
2 proxy fifty-fifty for a low capacity factor unit.

3 Q. How many days of the year does this
4 50 per cent figure assume you will be interrupted, your
5 natural gas supply?

6 A. I don't think I have that precisely
7 but a 10 per cent capacity factor for these units,
8 maximum 10 per cent capacity factor, would represent
9 something like 800 days. No, how many days, somebody?
10 25 days?

11 MR. SHALABY: A. 35 days.

12 MR. SMITH: A. 35 days a year of
13 operation. And so we would be looking at interruptions
14 on half of those days.

15 Q. So about 15 days a year?

16 A. 15, 20 days a year, yes.

17 Q. Have you made any actual study of the
18 amount of interruption that natural gas customers have
19 had in the Province of Ontario in recent times?

20 A. Interruptible customers?

21 Q. Yes.

22 A. How many times have they actually
23 interrupted?

24 A. I don't know.

25 Q. You do know that natural gas

1 contracts typically put a ceiling on the number of days
2 that you can be interrupted?

3 A. Yes.

4 Q. And do you know that typically that
5 maximum number of days is not reached; that is, they
6 are not interrupted for those number of days?

7 A. Yes, I am aware of that.

8 Q. And you said that you can minimize
9 the danger of interruption by locating a CTU unit in
10 certain parts of the province where storage might be
11 available or where there will be, for other reasons,
12 where limitations in capacity might not be so severe?

13 A. Yes.

14 Q. Pipeline capacity is what we are
15 talking about.

16 A. Yes.

17 Q. And if it is so desirable because of
18 the lower cost that you would achieve by burning gas
19 rather than oil and the environmental advantage derived
20 by burning more gas than oil, we could assume that
21 Hydro would do its utmost to ensure that it sited its
22 CTU units in places where you could maximize the use of
23 natural gas?

24 A. We can do that but I shouldn't talk
25 for the planning people here. But essentially you

1 still have to take into account the needs of where you
2 need the capacity on your grid to balance your grid.

3 Q. Of course.

4 A. But to the extent that we could, we
5 would obviously try to locate in the places that would
6 provide for the least interruptible supply of gas.

7 We also were advised by our discussions
8 or in our discussions with gas supply people that the
9 kind of interruptible service or the kind of load we
10 would represent would be a somewhat unique kind of
11 interruptible service for them as compared to their
12 normal interruptible service. So I don't think the
13 standard interruptible contract that specifies X
14 maximum days per year of interruption, et cetera, would
15 necessarily apply to an Ontario Hydro facility.

16 Q. Because of the size of your demand
17 you mean?

18 A. Yes.

19 Q. You would have more clout to
20 negotiate a better deal, wouldn't you?

21 A. No, we would suck the system dry
22 pretty quick if we decided to start up on short notice.
23 I use that to describe the effect as opposed to really
24 being precise, but we would draw a lot of natural gas
25 at a very fast delivery rate when we start up a

1 150-megawatt or 250-megawatt unit.

2 Q. These units can be started on
3 relatively short notice, I understand?

4 A. Yes.

5 Q. And shut down on relatively short
6 notice, too?

7 A. Yes.

8 Q. You state in the evidence here, and
9 it might have been you, Mr. Smith, and not Dr. Effer,
10 that, I quote here: "There may be rare circumstances
11 when it...." meaning natural gas "...could be delivered
12 during your peak period."

13 A. Yes.

14 Q. That's the same page I referred to
15 earlier.

16 A. Yes.

17 Q. That's your understanding, I gather,
18 from discussing it internally at Ontario Hydro and
19 whatever discussions you have had with the gas
20 industry?

21 A. Yes.

22 Q. Well, I suggest to you that the
23 reverse is true: that it would be a rare circumstance
24 indeed when it could be not be delivered during the
25 winter period. Do you feel confident enough in your

1 assertion to refute that?

2 A. I guess we would have to debate about
3 what we each mean by rare. And again I qualify it by
4 location. But our assessment is that there would be
5 significant periods when we could not count on gas
6 supply for those units.

7 Q. Are you able to help me any further
8 with respect to the support for the 50 per cent figure
9 that you have used in your costing?

10 A. No, I think we have described it as
11 being a reasonable proxy for costing this option. And
12 what I have said is that we have looked at it, we have
13 looked at a balancing of saying if the facilities were
14 in the western part of the province, southwestern part
15 of the province, that the availability would be higher;
16 if the facilities were in the eastern province, the
17 availability would be much less. And we have used it
18 as a proxy.

19 But I don't think we are trying to
20 characterize it as absolutely accurate and we would
21 accept your position, I think, so that we don't have to
22 go back and do more research that if in fact the
23 interruption rate was lower than we have anticipated,
24 then in fact the cost of that option would be --

25 Q. Right. Well, I don't want to

1 belabour the point and I suppose to come up with some
2 definitive figures on which we could all have
3 confidence, you would have to consult extensively with
4 the natural gas suppliers in the Province of Ontario?

5 A. Yes.

6 Q. Could we look at page M11 of Exhibit
7 471 just for a moment. It is the table that I started
8 with. Do you have that, Mr. Smith?

9 A. Yes.

10 Q. It's the comparison of LUECs. We
11 talked about application or option No. 5 where you are
12 assuming a fifty-fifty split oil and gas. Does that
13 apply to No. 7 as well? The larger unit?

14 MR. MEEHAN: A. At the 10 per cent
15 capacity factor, the same would apply there.

16 Q. Why is it that the costs have gone
17 down in No. 7 rather than up? Because the shaded bar
18 is shorter, so I assume the costs have gone down.

19 A. The initial capital cost is 10 per
20 cent lower. I think I am going to have to look at....

21 MR. SMITH: A. I think in simple terms
22 what we have done is we went through this in fair
23 detail in direct testimony by various witnesses but we
24 have lowered the capital cost and the OM&A cost and
25 that has been partially offset by the assumption we

1 have made on the interruptible gas/oil split, and the
2 net result is a lowering of that cost.

3 Q. All right. Thank you.

4 One last question on this interruptible
5 issue before I leave it. There is no problem with
6 Ontario Hydro acquiring interruptible gas in the summer
7 months, so far as you know?

8 MR. MEEHAN: A. We would assume that
9 interruptible gas is available a hundred per cent of
10 the time in the nine non-winter months.

11 Q. And Ontario Hydro over the past ten
12 years has increasingly become a summer peaking system,
13 has it not? Or put another way, your summer peak has
14 increased over the past ten years?

15 A. Increased a little bit more perhaps
16 than the winter peak.

17 Q. Right, that's my point.

18 A. I believe that's true.

19 Q. Combustion turbine units are peaking
20 units?

21 A. Yes.

22 Q. One other comment was made in the
23 transcript that I would like to ask you about briefly
24 if I could. This is in transcript 108, also during
25 your direct testimony, at page 18961. I can read it to

1 you. It is not really that difficult.

2 At about line 12, someone here is
3 talking - I am not sure who it is - and it says that --
4 you are talking about a CTU unit I do believe. You say
5 that it has the benefit of starting up quickly and
6 being loaded rapidly and it's an ideal option for
7 peaking. The disadvantage is that it needs clean high
8 quality fuel such as oil or gas and it tends to exhibit
9 poor thermal efficiencies, too. Who said that? Mr.
10 Dawson.

11 MR. DAWSON: A. I did, yes.

12 Q. The use of the term "poor thermal
13 efficiency" is a comparative term. Poorer than what?

14 A. Poorer than combined cycle or poorer
15 than integrated coal gassification of conventional
16 steam cycle.

17 Q. Are you aware of a more recent
18 technological advances in CTUs where there are
19 increased efficiencies available?

20 A. I think so. We are looking at the
21 latest designs of large industrial scale units.

22 Q. And are these new CTU units more
23 efficient than conventional steam cycle?

24 A. I don't believe so.

25 Q. Do you have some data you can point

1 me to to support that proposition?

2 A. We have estimated the design
3 efficiency of CTUs to be around 30 to 31 per cent. We
4 estimate the design efficiency of conventional steam
5 cycle to be in the range of 37 to 38.5 per cent.

6 Q. Now I am not in a position to refute
7 that at the moment, but can you tell me what type of
8 CTU unit are you using for that comparison.

9 A. That was based on 170 megawatt CTUs
10 which -- basically it was a GE Frame 7 design, which is
11 their latest unit.

12 Q. Thank you very much.

13 MR. SHALABY: A. Maybe I will add that
14 Exhibit 38 is entitled "Turbines for Tomorrow, Utility
15 Turbo Power for the 90s". It is an EPRI journal
16 article about turbo power.

17 Q. Thank you very much. I will look at
18 that.

19 Now when I came into the hearing room
20 today, I heard someone on the panel say that, I think,
21 I was surprised to hear this as I walked in, that you
22 thought there was 2 per cent of natural gas lost from
23 the wellhead to the burner tip. Was that you, Dr.
24 Effer?

25 DR. EFFER: A. A question was asked by

1 the lawyer --

2 Q. Mr. Watson for the Municipal Electric
3 Association.

4 A. And I agreed with him that that was
5 an appropriate, a fair percentage.

6 Q. Where did you get that 2 per cent
7 figure? From Mr. Watson? Or is that something you
8 heard somewhere else?

9 A. I think the way his question was
10 phrased was whether that was a typical percentage loss
11 and I agreed with him.

12 Q. Why did you agree with him?

13 A. I agreed with him because we have
14 done studies within Hydro and looked at a wide variety
15 of situations, and there is again a wide variety of
16 emission leakages from systems and that seemed to be
17 about an average figure for the kinds of numbers that
18 we have come up with.

19 Q. So, your study shows that on average
20 we are losing 2 per cent of the natural gas from the
21 point of the wellhead to the burner tip in Canada
22 through losses, line losses?

23 A. I can't say specifically with to
24 Canada but I know that the range of studies that we did
25 for a wide range of systems in North America arrived at

1 that kind of figure.

2 Q. Do you have a study available that
3 you could produce for us so I could look at that?

4 A. I don't believe that was formalized
5 into a report. It was one done just to, I think it was
6 part and parcel of the supporting information that was
7 was used for 40, the Greenhouse Report.

8 Q. The Greenhouse Report?

9 THE CHAIRMAN: That's Exhibit 40

10 MR. ROGERS: Exhibit 40. Thank you.

11 Q. Are you familiar with the term
12 "unaccounted for gas" in the gas utility business?

13 A. No, I am not, Mr. Rogers.

14 Q. So then you don't know the difference
15 between unaccounted for gas and line losses?

16 A. I believe this study that was done
17 that arrived at that range that I talked about was
18 connected with specifically line losses.

19 MS. PATTERSON: The reference, Mr.
20 Rogers, is Exhibit 468 on page 19 under the topic
21 "Transport".

22 MR. ROGERS: Thank you very much.

23 Q. Are you aware, sir, of a Canadian Gas
24 Association study on this very topic which showed line
25 losses in Canada, I am instructed, of 0.362 per cent,

1 substantially less than 2 per cent?

2 DR. EFFER: A. I'm personally not aware
3 of that study, no.

4 Q. Are you aware, sir, of a study in the
5 United States by a comparable association in the United
6 States which shows line losses there of less than 1 per
7 cent?

8 A. No, I am not.

9 Q. Are you aware that unaccounted for
10 gas in gas utility accounting includes such things as
11 meter error?

12 A. I am not aware of the factors
13 included in your estimate, no.

14 Q. And unbilled deliveries, for example,
15 you are not aware of that?

16 A. No.

17 MR. SMITH: A. Mr. Rogers, we are
18 operating without the benefit of a transcript on this
19 matter, but my recollection was that it was not
20 strictly line losses we were talking about. We were
21 talking about the CO(2) effect of natural gas outside
22 of the burning of natural gas or use of natural gas as
23 a fuel, and I don't think it was necessarily
24 characterized as line losses, but it may also have been
25 attributed to losses in the field. And I don't know

1 what the Gas Association's report says about those
2 statistics. We are operating without a transcript--

3 Q. I am too.

4 A. --and you heard it when you walked
5 into the room. But I don't recall it only being
6 related to line losses.

7 Q. The impression I had was that
8 somebody seemed to think that there was 2 per cent of
9 the natural gas coming out of the ground that was being
10 lost to the atmosphere before it was burned at the
11 burner tip.

12 MS. PATTERSON: The statement says during
13 transmission about 2 per cent of the gas is lost or
14 unaccounted for: example, stolen, lost through leaks,
15 et cetera.

16 MR. ROGERS: Thank you. I just wanted to
17 point out to the witnesses and to the Board that there
18 is a significant difference between unaccounted for gas
19 and line losses, and that line losses vent to the
20 atmosphere. Unaccounted for gas may simply be
21 accounting discrepancies; it may be gas that is stolen
22 and then burned; it may be gas that is delivered,
23 burned, but not accounted for, and so on. But I can
24 deal with that in other ways. Thank you very much,
25 gentlemen.

1 I have one last question for you and that
2 has to do with quite a different topic actually. It
3 has to do with the change in your proposals concerning
4 rehabilitating existing coal-fired plants and fitting
5 them with environmental controls to extend the life.

6 Can I ask the panel if you can point me
7 to any place in the evidence where there has been a
8 detailed assessment or analysis which shows us that
9 rehabilitating existing coal-fired plants, fitting them
10 with environmental controls, and implementing life
11 management and extension programs is technically,
12 environmentally or economically preferred to gas-fired
13 options?

14 MR. MEEHAN: A. I don't think we can
15 point you to anything in the evidence so far that--

16 Q. Does that.

17 A. --does that exactly.

18 MR. ROGERS: All right. Thank you,
19 gentlemen.

20 Thank you, Mr. Chairman. Those are my
21 questions.

22 THE CHAIRMAN: I think we will stop for
23 the day. Mr. Greenspoon, you will be first on Monday
24 morning; is that right?

25 MR. GREENSPOON: Yes, that's fine.

1 THE CHAIRMAN: Do you have any idea how
2 long you will be?

3 MR. GREENSPOON: I will be done before
4 lunch time, I anticipate.

5 MS. MORRISON: Then Ontario Public
6 Health.

7 THE CHAIRMAN: Ontario Public Health will
8 be next. We don't know how long they will be?

9 MS. MORRISON: Short, I think. And then
10 CEG, half a day.

11 THE CHAIRMAN: Then CEG will be half a
12 day. All right.

13 So Mr. Argue, you will be on after the
14 Health people?

15 MR. ARGUE: Yes.

16 THE CHAIRMAN: We will adjourn then until
17 Monday morning at ten.

18 THE REGISTRAR: We will adjourn until ten
19 o'clock Monday morning.

20

21 ---Whereupon the hearing was adjourned at 4:30 p.m., to
22 be resumed on Monday, February 24, 1992, at 10:00
a.m.

23

24

25

E R R A T A
and
C H A N G E S

To: Volume 110

Date: Wednesday, February 19, 1992.

| <u>Page No.</u> | <u>Line No.</u> | <u>Discrepancy</u> |
|-----------------|-------------------|--------------------------|
| v | Exhibit 475.3 | 19254 s/r 19246 |
| vi | Undertaking 478.4 | 19246 s/r 19254 |
| 19293 | 13 + 14 | group cost s/r root cost |



3 1761 11468483 0